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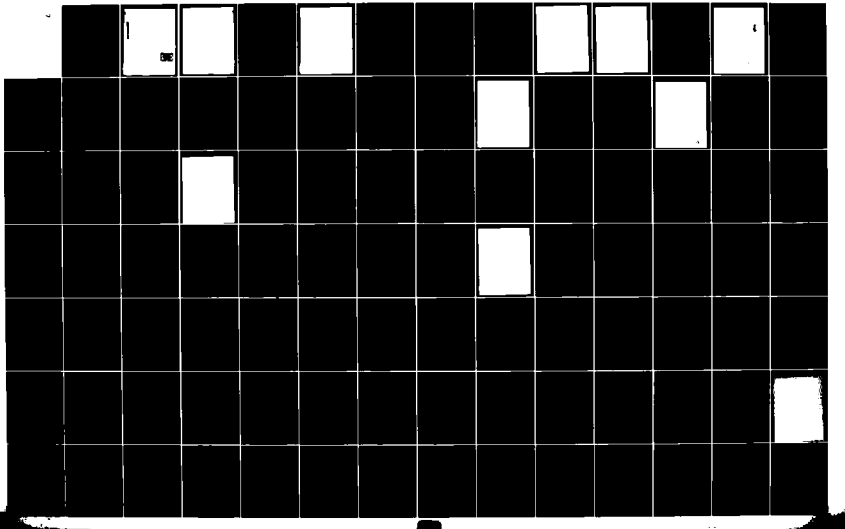

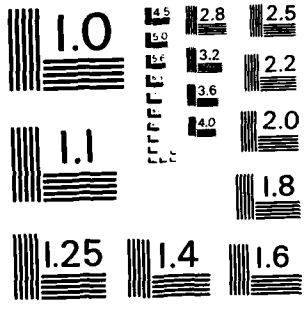

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Water quality activities
Sediment activities
Data collection and management
Water control automated data system

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents activities and accomplishments of the Southwestern Division (SWD) as related to reservoir regulation and water management activities for fiscal year 1983. Also presents detailed summaries of reservoir conditions, water quality activities, and coordinating activities with other Federal and non-federal basin interests groups.

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SECTION I - INTRODUCTION

1. PURPOSE OF REPORT. This report presents activities and accomplishments of the Southwestern Division (SWD) as related to reservoir regulation and water management activities throughout FY 1983. Detailed summaries of reservoir conditions, water quality activities, minutes of coordinating committee meetings and minutes of the annual RCC meeting, the Hydrologic Engineering and the Hydraulics Sections meeting are also included.

This report is prepared in conformance with ER 1110-2-1400, 24 April 1970, Reservoir Control Centers, paragraph 12c.

2. REFERENCE. Reservoir Control Center (RCC) - SWD Guidance Memorandum, dated June 1971, approved by the Chief of Engineers as a general basis for the RCC's activities.

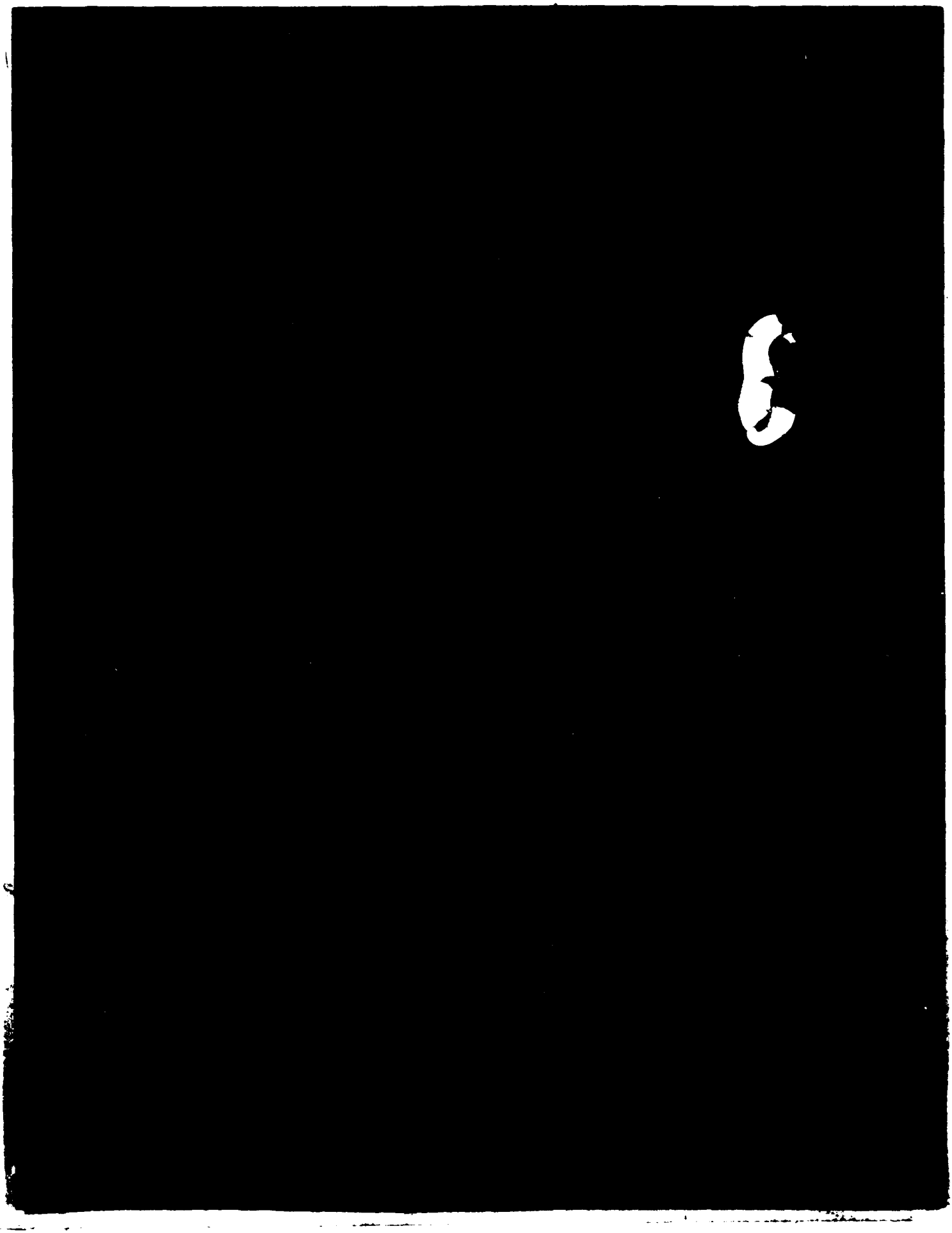
3. OBJECTIVES OF THE RESERVOIR CONTROL CENTER. The SWD RCC was established in 1967 by the Chief of Engineers to improve capabilities of the Corps of Engineers to perform its civil works mission as related to operation of reservoirs. The SWD RCC carries out its responsibilities by:

a. Organizing coordinating committees and/or participating in committees to accomplish mutual understanding among water interests regarding use and regulation of water resources.

b. Providing interbasin coordination of day-to-day regulation needs for river systems for all purposes.

c. Surveillance of daily operations and continuous analysis of project needs.

d. Furnishing technical assistance to personnel of district offices in related efforts to improve the reliability of regulations and hydrologic determinations.



SECTION II - WATER CONTROL ACTIVITIES IN SWD

1. RESERVOIR REGULATION

a. Lake Regulation During FY83. Lake regulation activities for Division lakes and Section 7 lakes during FY83 are summarized in Section VI of this report. The Division considers two events that were the most significant activities of the past year. Events are the installation of a ground receive station for the SWD Water Control Data System and the devastating flood event of December 1982, which occurred in the Arkansas and White River Basins. For more detailed discussions on these activities, see paragraph 4d(2) of this section and paragraphs 1d(1)(b), 3d(3), and 6d of Section VI; respectively.

Operational data summaries for all of the SWD projects, including Section 7, are shown in tabular form, two projects per page in Section VII. An index, by basin, to these tables is included which also lists pertinent data for each project. Also included is a listing in alphabetical order giving names of both the lake and dam where different.

b. Regulation Plans. The interim emergency regulation plan for Grapevine Lake was evaluated with the Trinity Basin computer simulation model to establish the spillway operation frequency. In addition, computer regulation simulations have continued for the evaluation of added hydropower at several projects in the Arkansas and Red River Basins.

c. Water Control Manuals. A summary entitled "Status of Water Control Manuals in SWD" is included in Section IV of this report. The summary shows the status and completion schedule through FY 1986 for manuals on 114 lakes and 12 river systems. At the end of FY 1983, there were 93 Corps of Engineers projects (76 lakes and 17 locks and dams) and 16 Section 7 lakes in operation in SWD.

During FY 1983, the SWD Reservoir Control Center received and reviewed eight water control manuals that were submitted by the districts in the form of new manuals and revisions to old manuals. The schedule for FY 1984 includes the development of six new manuals and the revision of manuals for nine projects.

d. Section 7 Project Regulation. Within SWD there are 16 existing reservoirs owned and operated by other agencies. Presently the Bureau of Reclamation is constructing two additional reservoirs. McGee Creek Dam to be located on Muddy Boggy Creek, a tributary of the Red River, and Brantley Dam to be located on the Pecos River. The flood control storage contained in these projects are regulated by the Corps in accordance with Section 7 of the Flood Control Act of 1944. The districts are continuing their efforts to bring the manuals and regulation plans into compliance with requirements contained in paragraph 208.11, Part 208 Flood Control Regulations, Chapter II, Title 33 of the Code of Federal Regulations (41 FR 20401, May 18, 1976). Due to the varied approaches between the districts on real time regulation for Section 7 projects, SWD issued a policy letter on 21 March 1983. The purpose of the letter was to supersede previous SWD guidance and to provide current policies on Section 7 projects.

The letter also instructed the districts to begin coordinating these policies with project owners in an expedious manner in order that water control manuals for existing reservoirs can be finalized within the next two years.

2. SOUTHWESTERN DIVISION WATER QUALITY PROGRAM AND ACTIVITES.

a. Responsibilities. The Water Management Branch is assigned the responsibilities to coordinate and direct activities in SWD in the water quality field. This provides for water quality objectives being included as an effective part of our total water management program. Specific activities in the water quality program are as follows:

(1) Conduct technical studies and provide guidance on water quality control.

(2) Review and provide technical assistance in programs for predicting the natural and modified water quality in impoundments, rivers, coastal areas, and estuaries for project planning, design, and regulation activities.

(3) Review and provide technical assistance on project design and reservoir regulation studies in connection with water quality control performed within the division, including multiple level outlet facilities, reservoir simulation studies, reregulation structures, and release reoxygenation systems.

(4) Provide coordination support in interagency liasion as related to water quality control through reservoir regulation, including formulation of operating plans and cooperative data collection programs.

(5) Coordinate with Planning and Construction-Operations Divisions, and the districts on SWD water quality investigation programs.

(6) In coordination with the Geotechnical and Materials Branch, manage the water quality investigation activities of the division laboratory.

(7) Responsible for technical engineering solutions to water quality problems in existing projects; reviewing, coordinating, and acting as consultants to other engineering and planning elements in the division office and district offices.

(8) Coordination of division actions required by ER 1130-2-334 for reporting of water quality management of Corps projects.

b. Organization.

(1) Division. Water quality activities in SWD are coordinated by the Water Management Branch. These duties require the part-time efforts of three engineers. One of these, Mr. Charles Sullivan, Chief, RCC, is a member of the OCE Committee on Water Quality.

(2) Districts. Presently the organizations for water quality management vary within the districts. In all of the districts, water quality associated with planning and design of the projects is coordinated by organizational elements within the Engineering or Planning Divisions. In two of the districts the monitoring and reporting specifically required by ER 1130-2-334 and that required for dredging and other construction are done by the Construction and Operations Divisions.

(3) Laboratory. The division laboratory is fully staffed and equipped to conduct the tests of water usually required by the districts for use in planning, design, construction, and operation of the projects.

c. Special Activities in FY83.

(1) Specific Project Problems. Water quality related problems and activities at individual projects are discussed in the district reports. Only minor fish kills were reported at Great Salt Plains, Ft Gibson and Keystone Lakes.

(2) Water Quality Management Reports. Water quality management reports were completed for 3 projects in FY83. These projects are Lewisville, Grapevine, and Navarro Mills Lakes.

(3) Base Line Data. Base line data acquisition has been conducted at 38 SWD reservoirs, 17 in Fort Worth, 2 in Little Rock and 19 in Tulsa. Our goal in this program is to develop a data base for all SWD reservoirs to 1) identify existing or potential problem areas and 2) for comparative purposes should problems arise.

(4) Table Rock Dissolved Oxygen. Prototype testing of oxygen injection into the station service unit penstocks was conducted in the fall of 1982. Test results were inconclusive and further testing is scheduled for FY84.

(5) Addicks and Barker Reservoirs Water Quality Study. Results of a three year study to evaluate the effects of length of impoundment on water quality in Addicks and Barker reservoirs will be available this year.

d. Long-Term Goals. The following are presently considered as long-term, continuous goals of this division, and consequently the RCC, in the water quality field.

(1) To obtain sufficient water quality information from all of our projects to determine whether all state standards and environmental objectives can be met without adverse impact on authorized uses.

(2) To promote the organization of effective water quality elements in the division and districts to obtain the maximum coordination for handling all water quality matters in the division.

(3) Provide helpful and thorough guidance to the districts on water quality matters.

e. Immediate Goals. The following actions have been scheduled for accomplishment in the near future:

(1) Continue the two to three year intensive monitoring program for SWD reservoirs. This ongoing program will be continued until base line data are available for all SWD reservoirs.

(2) Review the basic water quality monitoring program this year.

3. SWD SEDIMENT PROGRAM AND ACTIVITIES. Sediment activities for the year included approval of (1) Arcadia Lake DM 28 - Sedimentation and Degredation Ranges, (2) Joe Pool Lake DM 22 - Reservoir Clearing and Sedimentation and Degredation Ranges and (3) Ray Roberts Lake (Aubrey) DM 21 - Reservoir Clearing and Sedimentation and Degredation Ranges. Preliminary resurvey results (Form 1787's) were received for Eufaula and Heyburn Lakes. Approved FY83 funds for resurveys of Navarro Mills, Wright Patman and B.A. Steinhagen Lakes were transferred to the Grapevine Lake Spillway Emergency Repair project. Resurveys of Galisteo Reservoir, Clearwater Lake, Marion Lake and the initial range survey of Copan Lake were completed in FY83. Reconnaissance surveys were conducted at several other SWD lakes.

4. DATA COLLECTION AND MANAGEMENT.

a. Stream Gaging Program. Much of the data required for regulation, investigation and design of water resources projects result from the reporting and measurement of flow, water quality, and sediment. Most of these data are obtained through a Cooperative Stream Gaging Program between the Corps and the USGS. During FY 1983 the SWD-USGS cooperative program included 507 stations. An additional 69 stations were operated independently by the district Corps offices. In FY83, the total cost of the SWD program was $2.1 million with $1.8 million being transferred to the USGS. The following tabulation shows a breakdown of the program by class of funds used to finance the program.

Class of Funds	Number of Stations	C of E Cost ($1,000)
Survey Investigation	10	40
General Coverage	43	63
Planning	0	0
Operation & Maintenance	434	1,890
New work & construction	20	120
Total:	507*	2,113

NOTE: *Some stations may be counted under more than one classification.

b. Cooperative Reporting Networks. The National Weather Service (NWS) and the Corps of Engineers began their 46th year of cooperation in establishing and operating networks of river and/or rainfall reporting stations. Reports from these stations supplement those stations that are maintained by the NWS which are made available to the Corps of Engineers for flood control operations and flood forecasting.

Data from these networks are transmitted to the Corps of Engineers district and division offices via telephone and teletype service from the NWS collection office. SWDO maintains teletype drops on two circuits which carry data from the NWS RAWARC network. These two circuits carry radar, hydrological reports, and other data essential to our water control management functions. These data include detailed precipation reports, river stage information, warnings and descriptions of severe storms and floods, and river forecasts developed by the NWS. SWDO also maintains a weather FAX machine which receives satellite pictures, radar plots, 24-hour rainfall maps and other weather maps.

The estimated FY 1983 cost for SWD responsibilities in supporting 593 rainfall stations in the Cooperative Reporting Networks was $193,397.

c. Current Monitoring System. In June 1982 the RCC began using the Water Control Data System (Harris Computer) located in the Southwestern Division office, for computations that are necessary in the RCC's daily water control activities. Two districts are using desk-top minicomputers to assist in polling data from about 70 stations. To date, Harris minicomputers have been installed in the SWDO, Tulsa District, Fort Worth District, and Little Rock District offices as a part of the Water Control Data System. The following paragraphs describe continued efforts in developing the total system.

d. Water Control Data System.

(1) The "Water Control Data System Master Plan" for SWD, dated April 1979 was approved by the Office, Chief of Engineers in June 1979 for funding and detailed design. The major components of the system are:

(a) Remote Gaging Stations. The plan includes about 100 lake gages and between 200 and 350 river gages that are to be equipped with data collection platforms (DCP) by the end of FY 1985.

(b) Communication. The DCP's transmit the remote gaging station data over the Geostationary Orbiting Environmental Satellite (GOES) System. Communication between the district and division data processing units will be via telephone lines. A Ground Receive Station is located at Fort Worth, Texas, for receipt of the GOES transmissions.

(c) Data Acquisition and Processing Equipment. The distributed processing system dedicated to water control activities contains minicomputers located at the division office and three of the five district offices. Two of the district offices and the division office share one computer. The hardware is compatible in order to allow the use of common software and data exchange between offices. The data bases at each district office will be available to the division office. The data base uses the "TOTAL" data base system and utilizes the SHEF code for data exchange with the National Weather Service.

(d) Data Display and Distribution. Data will be displayed in individual offices with color graphic CRT's, plotters, and printers. Provisions are being made to distribute and/or exchange data with other cooperators.

Examples of data exchange requirements are the Office of Chief of Engineers, Lower Mississippi Valley Division (LMVD), Southwestern Power Administration (SWPA), state and local river authorities or agencies.

(2) A Ground Receive Station (GRS) for the SWD system was installed at the Federal Center in Fort Worth, Texas, in September 1983. This is a Synergetics Model 10C Direct Readout Ground Receive Station equpped with 2 antennas (one for GOES east and one for GOES west). Both dial-up and direct line access will be provided between the GRS and the WCDS computers.

(3) A Water Control Data System Steering Committee was formed in July 1983 for the purpose of guiding the development of the WCDS software. The Steering Committee has the responsibility for approving plans and schedules, monitoring progress, assigning responsibilities to group leaders, and coordinating with OCE and other districts. The Steering Committee is chaired by the Chief of the SWD Water Management Branch, with members consisting of chiefs of district hyraulics branches and the three group chairmen functioning under the Steering Committee. These groups are the System Software group, chaired by the Chief of the SWD Automatic Data Processing Center (ADP); the Applications Software Group chaired by the Chief of the SWD Hydrologic Engineering Section; and the Users Group, chaired by the Chief of the SWD Reservoir Control Center. Each of these groups contain members from district elements. Figure 1 shows the responsibilities of each group.

(4) SWD is participating in a Random Reporting (R/R) test being conducted by the National Earth Satellite Service (NESS), the Corps of Engineers, and Bureau of Reclamation for the purpose of obtaining factual information concerning this type of data collection reporting. The major goals of the test are to determine (a) reliability; (b) manageability; (c) ability to operate within NESS guidelines for R/R; (d) efficient use of NESS resources; and (e) type of R/R operation NESS will support within its system. This test is scheduled for conclusion in FY84.

(5) At the end of FY 83, there were 172 DCP's installed, 157 on hand for installation and spares and 7 on order. There are also 72 gages equipped with DARDC's.

(6) Funding. During FY83 expenditures from the PRIP fund were $411,600 for the Ground Receive Station, Data Collection Platforms, and sensors.

e. Cooperative Data Bank and Forecasting Activity. During the past year, RCC has continued to participate in and encourage the advancement of programs for automated data collection and interagency cooperation in forecasting activity and data bank utilization. Currently, SWD maintains a data bank on the Water Control Data System computer for Daily Lake Reports, Daily Power Generation Reports, and Daily River Reports. These data banks are updated daily and the data are maintained until the end of the month then used for monthly summaries. These data, with serveral district auxiliary programs and data bases, have been used to make forecasts and reports available for exchange as needed between the districts and SWDO. In addition, the data are made available to other users which have a need to be aware of the water control activities on a real-time basis. These users include SWPA, NWS, LMVD, and OCE. SWD has also participated

in a program to develop a data base (DATSYS) for water control information for the Mississippi River Basin.

SWD districts have participated in storing data in the EPA STORET and USGS WATSTORE data banks. Both of these systems have also been used for retrieving data. The Little Rock District has placed sediment data in the WATSTORE data system. Albuquerque discontinued inputting data into STORET in November 1982.

5. COORDINATION WITH WATER MANAGEMENT INTERESTS.

a. General. The benefits deriving from personal contact with other persons associated with water management activities are well recognized by the RCC. For this reason, special emphasis has been placed on maintaining this personal contact through meetings and workshops sponsored by the districts and the RCC with the marketing agency, project personnel, river basin authorities, other RCC's, the Chief's office and others.

(1) The Hydrologic Engineering Section and the Hydraulics Section (other sections in the Water Management Branch) furnish support to the RCC. The Hydrologic Engineering Section conducts systems studies of reservoir regulation and the Hydraulics Section reviews studies on sediment and water quality activities.

(2) A meeting of lake regulation personnel of each of the districts and the RCC is held annually at the division Reservoir Control Center for the purpose of discussing timely topics and exchanging information. However, this year's meeting was held jointly with the Hydrologic Engineering and the Hydraulics Sections. The minutes of the 2, 3 and 4 November 1983 meetings are included in Section VIII.

b. Agency Coordination.

(1) Arkansas River Basin Coordinating Committee. Member organizations include the Corps of Engineers, SWPA, Federal Energy Regulatory Commission (FERC), SCS, Arkansas Soil and Water Resources, Oklahoma Water Resources Board, and Kansas Water Resources Board, Chairman of the committee is Mr. R. Terry Coomes, Chief, Water Management Branch, SWD. The periodic committee meetings provide an opportunity for the Corps to present activities, problems, and proposed solutions regarding regulation of flows on the Arkansas River for maximum overall benefits. In turn, representatives of the States and other Federal agencies may critique our activities and present their ideas and special operation proposals.

(2) Trinity River Basin Water Management Interests Group. In order to provide a means for exchanging ideas and coordinating the interests of local, State and Federal agencies and private companies in the regulation and development of water resources of the Trinity River Basin, the RCC has initiated and sponsored meetings of the Trinity River Basin Water Management Interests Group.

The thirteenth annual meeting of this group was held on 28 June 1983. Attendance included 30 persons representing the State of Texas, several municipalities, water districts, companies, and agencies of the Federal Government.

Presentations were made by the Corps of Engineers, National Weather Service, Trinity River Authority, US Geological Survey, North Central Texas Council of Governments, Dallas Water Utilities, and Texas Department of Water Resources. An agenda, minutes of the meeting and a list of attendees are included in Section VIII of this report.

(3) Cooperation with Lower Mississippi Valley Division. The SWD RCC continues its cooperation with LMVD and provides observed, as well as forecasted data significant to the water management activities in LMVD. Exchange of data within the Mississippi River Basin has been improved by the development of a Data Management System by HEC on the Boeing Computer System for critical river stations within the basin. Both forecasted and current data can be retreived for individual division and district use.

(4) Cooperation with Federal Energy Regulatory Commission. Periodic formal and informal contact through meetings sponsored by the RCC keeps Corps and FERC staff members informed on trends and problems associated with production of hydroelectric power. The RCC also coordinates activities on FERC license applications for nonfederal hydropower development at SWD Corps projects.

(5) Cooperation with Southwestern Power Administration. The SWPA is an agency of the United States, established in the Department of the Energy, to execute the purposes of the Flood Control Act of 1944 with respect to the disposition of the electric power and energy made available from the reservoir projects under control of the Department of the Army in the area comprising all of Arkansas and Louisiana and portions of Missouri, Kansas, Texas, and Oklahoma. The scheduling of releases for hydroelectric power production from the 17 Corps of Engineers projects within SWD has a significant effect on the overall water management activites in the division. Therefore, close cooperation and continuous communication between the Corps and SWPA are mandatory. A Memorandum of Understanding was signed by the SWPA and the Corps of Engineers in 1980. SWPA and SWD are in the process of developing a more detailed operating arrangement to assist in the operations of hydropower projects within SWD. Specific activities included in the operating arrangement for cooperation between SWPA and RCC, are monthly scheduling of power production, preparation of data for reports to the Federal Energy Regulatory Commission (FERC), and daily coordination of routine data on current conditions, inflow forecasts, and release schedules. The RCC has taken every opportunity to improve and strengthen relations with SWPA through correspondence, regularly scheduled and special meetings, providing access to our time-share systems, and by special studies aimed at improving energy production and scheduling at SWD power projects.

(6) National Weather Service. Future workshops will be needed for estasblishing criteria and implementation procedures for comprehensive interagency data banks. The new automated data collection and handling equipment being acquired by the Corps and NWS will require extensive coordinating efforts over the next few years.

Figure 1

STEERING COMMITTEE - Terry Coomes

- assigns responsibility
- approve schedules
- monitors progress
- resolves turf battles
- coordinates with OCE and other divisions

SYSTEM SOFTWARE
John Turner - SWDAD

1. Evaluates, purchases and maintains all hardware (except field equip.)
2. Obtains, implements and maintains software for acquisition group,* data base and system aspects of data base utility group*
3. Supports application groups.
4. Prepares schedules and implementation plans.
5. Assigns tasks to districts, contractors, labs, etc, monitors progress and reviews final products.

APPLICATIONS SOFTWARE
Ron Hula - SWDED-H

1. Obtains, implements and maintains software for analysis group* and applications aspects of data base utility group.*
2. Evaluates existing applications software and implements and/or modifies to meet user requirements.
3. Reviews documentation of software and accepts or requires revision as necessary.
4. Maintains inventory of available software and documentation.
5. Implements acceptable software for use SWD wide.
6. Arranges for training in applications as necessary.
7. Coordinates development and use of applications software with HEC and other Corps districts and divisions.
8. Supports system software group.
9. Prepares schedules and Implementation Plans.

USERS
Charles Sullivan - SWDED-WR

1. Coordinates all funding issues for system.
2. Coordinates & implements the selection, purchase, installation and maintanence of field equipment.
3. Monitors SWD downlink performance.
4. Presents user viewpoint to applications and system software groups.
5. Coordinates with OCE and other Corps offices.
6. Develops interagency agreements for data exchange including financial arrangements.
7. Develops user priorities for software development.
8. Supports applications group in evaluating existing software.
9. Updates SWD master plan and software design manual as necessary.
10. Prepares schedules and Implementation plans.

* See SWD Software Manual

SECTION III - FACILITIES AND PERSONNEL

1. Facilities.

a. Office Space. Since February 1981, SWD personnel have occupied quarters in the Santa Fe Building, 1114 Commerce Street, Dallas, Texas. Space occupied by the RCC includes an open-space working area, and a computer equipment room.

b. Display Facilities. All of the RCC display equipment used for conferences and for briefing of higher authorities is located in the Engineering Division conference room. This equipment includes a triple duty wall display unit containing metal chalkboards, vinyl covered cork boards, and white metal panels adequate for grease pencil or for projection screen; various projection equipment, and a project screen.

c. Communications Equipment. The computer equipment room contains two dot-matrix hard-copy TTY terminals; one letter quality terminal, a CRT which is hardwired to the Harris minicomputer, a Tektronix color graphics terminal with plotter and digitizing tablet, magnetic tape storage, weather FAX machine, and a small room which houses the two weather teletypes. The time-share terminals are used for access of Harris, Honeywell, WRDC and CDC computer facilities. The SWDO Ground Receive Station (for receipt of remote sensor information via GOES) is located at the Federal Center in Fort Worth, Texas.

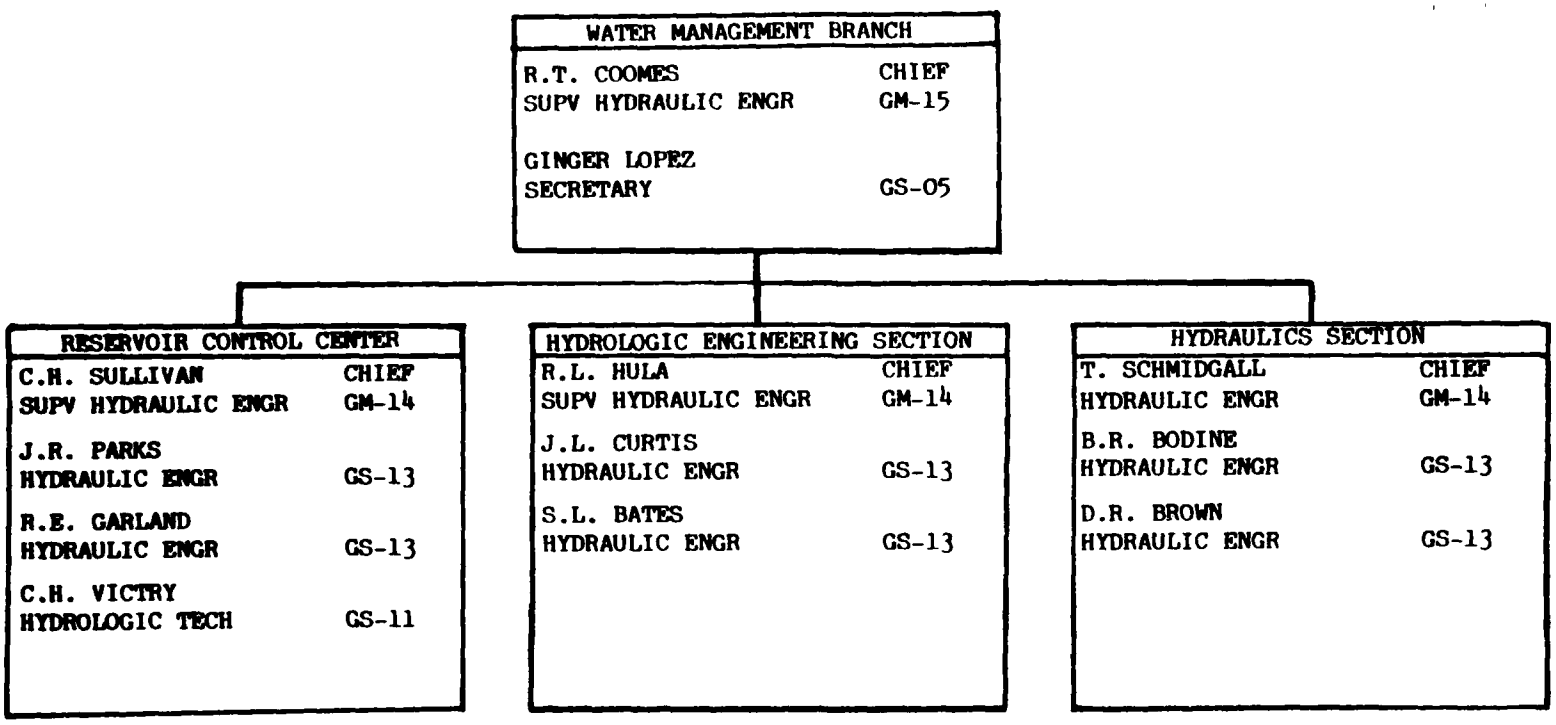
2. Personnel.

a. Staff. The authorized staff of the RCC consists of one supervisory hydraulic engineer, two hydraulic engineers and one hydrologic technican (a reduction of two spaces). The RCC is supported in technical studies by the Hydrologic Engineering and the Hydraulics Sections. The current organization chart for the SWD Water Management Branch is shown in figure 2. It should be noted that the organization chart reflects a restructuring of the branch during FY83. The restructure consisted of moving the hydraulics functions into the branch along with shifting some functions into a newly established hydrologic modeling section, located in the Tulsa District.

b. Training. The RCC periodically assesses the training needs of its personnel and schedules that training which is required and desirable for maintaining expertise and capability to fulfill its mission. Scheduled training for the immediate future includes various hydrologic and management courses.

Additional training objectives are accomplished through active participation and leadership by RCC personnel in committees such as the Arkansas River Basin Coordinating Committee, the Red and Trinity River Basin Water Management Interests Group, and the Corps of Engineers Committee on Water Quality.

Figure 2


WATER MANAGEMENT BRANCH
R.T. COOMES CHIEF
SUPV HYDRAULIC ENGR GM-15
GINGER LOPEZ
SECRETARY GS-05
RESERVOIR CONTROL CENTER
C.H. SULLIVAN CHIEF
SUPV HYDRAULIC ENGR GM-14
J.R. PARKS
HYDRAULIC ENGR GS-13
R.E. GARLAND
HYDRAULIC ENGR GS-13
C.H. VICTRY
HYDROLOGIC TECH GS-11
HYDROLOGIC ENGINEERING SECTION
R.L. HULA CHIEF
SUPV HYDRAULIC ENGR GM-14
J.L. CURTIS
HYDRAULIC ENGR GS-13
S.L. BATES
HYDRAULIC ENGR GS-13
HYDRAULICS SECTION
T. SCHMIDGALL CHIEF
HYDRAULIC ENGR GM-14
B.R. BODINE
HYDRAULIC ENGR GS-13
D.R. BROWN
HYDRAULIC ENGR GS-13

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16)

Revised: 1 January 1984

RESERVOIR	STREAM	OWNER	DIST	WATER CONTROL MANUAL SUBMITTED	SCHEDULED THRU FY 86	APPROVED
White Riv Master		CE	LRD	Dec 54 F		Dec 55 OCE
Beaver	White Riv Basin	CE	LRD	Oct 66 F		Jan 67 OCE
Table Rock	White Riv Basin	CE	LRD	Oct 66 F		Jan 67 OCE
Bull Shoals	White Riv Basin	CE	LRD	Oct 66 F		Jan 67 OCE
Norfork	White Riv Basin	CE	LRD	Oct 66 F		Jan 67 OCE
Clearwater	Black River	CE	LRD	Jan 73 U	Jun 85 R	Feb 73 SWD R*
Greers Ferry	Little Red River	CE	LRD	Oct 65 F		Jun 66 OCE
Arkansas Master		CE	AD	Apr 69 F		Jun 70 OCE
Pueblo (1)	Arkansas River	BR	AD	Dec 77 F	Jan 84 U	Feb 79 SWD
Trinidad	Purgatorie River	CE	AD	Jul 78 F	May 84 U	Oct 79 SWD
John Martin	Arkansas River	CE	AD	Nov 82 U		Jan 83 SWD AR
Arkansas Master		CE	TD	Apr 76 U		Sep 80 SWD
Cheney (1)	N. F. Ninnescah	BR	TD	Oct 65		Mar 66 OCE AR
El Dorado	Walnut River	CE	TD	Feb 81 F		Feb 83 SWD
Kaw	Arkansas River	CE	TD	Dec 77 F		Jan 78 SWD
Great Salt Plains	Salt Fork Ark	CE	TD	Nov 66 F		Apr 67 OCE
Keystone	Arkansas River	CE	TD	Nov 63 F	Sep 85 U	Apr 65 OCE
Heyburn	Polecat Creek	CE	TD	Jan 57	May 84 R	Feb 62 OCE AR
Verdigris System						
Toronto	Verdigris River	CE	TD	Jun 66 F	Mar 86 U	Aug 66 OCE
Fall River	Fall River	CE	TD	Jun 66 F	Oct 86 U	Aug 66 OCE
Elk City	Elk River	CE	TD	Jun 66 F		Aug 66 OCE
Pearson-Skubitz-Big Hill	Big Hill Creek	CE	TD	Aug 82		Sep 82 SWD AR
Oologah	Verdigris River	CE	TD	Dec 75 U		Jan 76 SWD AR
Copan	Caney River	CE	TD	Nov 82 F		Mar 83 SWD
Hulah	Caney River	CE	TD	Oct 68	Sep 86	Jun 69 OCE AR
Birch	Bird Creek	CE	TD	Aug 81 F		Sep 81 SWD
Skiatook	Homing Creek	CE	TD		Aug 84	

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16) Revised: 1 January 1984

RESERVOIR	STREAM	OWNER	DIST	WATER CONTROL MANUAL SUBMITTED	SCHEDULED THRU FY 86	APPROVED
Upper Grand Sys						
Council Grove	Neosho River	CE	TD	Apr 74 F		May 74 SWD
Marion	Cottonwood River	CE	TD	Jul 74 F		Aug 74 SWD
John Redmond	Neosho River	CE	TD	Sep 76 R		
Pensacola (1)	Neosho River	GRDA	TD	Sep 64	Dec 84 R	Mar 65 OCE AR
Markham Ferry (1)	Neosho River	GRDA	TD	Sep 64	Dec 85 R	Mar 65 OCE AR
Fort Gibson	Neosho River	CE	TD	Sep 64	Jul 85 R	Mar 65 OCE AR
Tenkiller Ferry	Illinois River	CE	TD	Jul 76 F		Mar 77 SWD
Conchas	Canadian River	CE	AD	Jun 67 F		Jan 68 OCE
Sanford (1)	Canadian River	BR	TD	Sep 65	Sep 85 U	Feb 66 OCE AR
Norman (1)	Little River	BR	TD	Feb 65 F		Nov 65 OCE
Optima	N. Canadian River	CE	TD	Dec 69		Feb 70 SWD AR
Fort Supply	Wolf Creek	CE	TD	Dec 69		Feb 70 SWD AR
Canton	N. Canadian River	CE	TD	Dec 69		Feb 70 SWD AR
Arcadia	Deep Fork River	CE	TD		Oct 85	
Eufaula	Canadian River	CE	TD	Sep 62 F		Nov 63 OCE
Newt Graham PT VI, L&D 18	Arkansas River	CE	TD	Apr 72 F		Jun 72 SWD
Chouteau PT V, L&D 17	Arkansas River	CE	TD	Apr 72 F		Jun 72 SWD
Webbers Falls PT IV, L&D 16	Arkansas River	CE	TD	Jul 72 F		Jul 72 SWD
R. S. Kerr PT III, L&D 15	Arkansas River	CE	TD	Apr 72 F		Apr 72 SWD
W. D. Mayo PT II, L&D 14	Arkansas River	CE	TD	Oct 72		Jan 73 SWD AR
Wister	Poteau River	CE	TD	Mar 74 F		Jun 74 SWD
Blue Mountain	Petit Jean	CE	LRD	Feb 68 F	Sep 85 U	Mar 68 OCE
Nimrod	Fourche La Fave	CE	LRD	Sep 67 F		Mar 68 OCE
Lock & Dam 13	Arkansas River	CE	LRD	Sep 74 F		Sep 74 SWD
Ozark-Jeta Taylor	Arkansas River	CE	LRD	Sep 74 F		Sep 74 SWD
Dardanelle	Arkansas River	CE	LRD	Mar 76 F		Apr 76 SWD
Lock & Dam 9	Arkansas River	CE	LRD	Mar 76 F		Apr 76 SWD
Lock & Dam 8 Toad Suck Ferry	Arkansas River	CE	LRD	Jul 74 F		Sep 74 SWD
Lock & Dam 7 Murray	Arkansas River	CE	LRD	Jul 74 F		Sep 74 SWD
Lock & Dam 6 David D. Terry	Arkansas River	CE	LRD	Oct 71 F	Sep 86 U	Sep 74 SWD

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16 Revised: 1 January 1984

RESERVOIR	STREAM	OWNER	DIST	WATER CONTROL MANUAL SUBMITTED	SCHEDULED THRU FY 86	APPROVED
Lock & Dam 5	Arkansas River	CE	LRD	Oct 71 F	Sep 86 U	Sep 74 SWD
Lock & Dam 4	Arkansas River	CE	LRD	Oct 71 F	Sep 86 U	Sep 74 SWD
Lock & Dam 3	Arkansas River	CE	LRD	Oct 71 F	Sep 86 U	Sep 74 SWD
Lock & Dam 2 and Arkansas Post Channel	Arkansas River	CE	LRD	Oct 71 F	Sep 86 U	Sep 74 SWD
Red River Master		CE	TD	Nov 62		Feb 63 OCE AR
Altus (1)	N. Fork Red	BR	TD	Dec 67 F		Oct 68 OCE
Mountain Park (1)	Otter Creek	BR	TD	Jan 76	Jun 86 R	Mar 76 SWD R*
Truscott Brine Lake	Bluff Creek	CE	TD		Aug 84	
Lake Kemp (1)	Wichita River	WCID	TD	May 73 F		Jun 73 SWD
Waurika	Beaver Creek	CE	TD	Apr 77 F		Apr 77 SWD
Foss (1)	Wachita River	BR	TD	Feb 61 F	Jul 86 U	May 61 OCE
Fort Cobb (1)	Cobb Creek	BR	TD	Jan 60 F		Mar 61 OCE
Arbuckle (1)	Rock Creek	BR	TD	Nov 66		Sep 67 OCE AR
Texoma	Red River	CE	TD	Jun 75 F		Sep 82 SWD
Pat Mayse	Sanders Creek	CE	TD	Dec 66 F		Oct 67 OCE
Sardis	Jackfork Creek	CE	TD		Feb 84	
McGee Creek (1)	Muddy Boggy Creek	BR	TD		Jun 85	
Hugo	Kiamichi River	CE	TD	May 82		Jul 82 SWD AR
Little Riv Sys						
Pine Creek	Little River	CE	TD	May 74		Jul 74 SWD AR
Broken Bow	Mountain Fork	CE	TD	Jul 74 F		Nov 74 SWD
DeQueen	Rolling Fork	CE	LRD	May 76 F		Jun 76 SWD R
Gillham	Cossatot River	CE	LRD	Mar 67	Sep 84 R	Apr 81 SWD R*
Dierks	Saline River	CE	LRD	Jun 75 F		Apr 76 SWD
Millwood	Little River	CE	TD	Sep 73 F		Nov 73 SWD
Sulphur Riv Master						
Cooper	Sulphur River	CE	FWD			
Wright Patman	Sulphur River	CE	FWD	Sep 74 U	May 85 R	Nov 74 LMVD
Lake O' The Pines	Cypress Creek	CE	FWD	Jun 74 U		Nov 74 LMVD
Neches Riv Master		CE	FWD	May 62		Mar 63 OCE AR
B. A. Steinhagen	Neches River	CE	FWD	Jul 51		Feb 63 OCE AR
Sam Rayburn	Angelina River	CE	FWD	Jan 73 R	Mar 85 R	Feb 73 SWD AR
Trinity Riv Master		CE	FWD	May 75 P		May 75 SWD
Benbrook	Clear Fork	CE	FWD	May 75 P	Sep 84	May 75 SWD

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16) Revised: 1 January 1984

RESERVOIR	STREAM	OWNER	DIST	WATER CONTROL MANUAL SUBMITTED	SCHEDULED THRU FY 86	APPROVED
Joe Pool	Mountain Creek	CE	FWD		Sep 85	
Lewisville	Elm Fork	CE	FWD	May 75 P	Sep 86	May 75 SWD
Grapevine	Denton Creek	CE	FWD	May 75 P	Sep 86	May 75 SWD
Lavon	East Fork	CE	FWD	May 75 P		May 75 SWD
Navarro Mills	Richland Creek	CE	FWD	May 63		Jul 64 OCE AR
Bardwell	Waxahachie Creek	CE	FWD	Aug 63		Jul 65 OCE AR
Wallisville	Trinity River	CE	GD	(Work on project stopped)		
Buffalo Bayou Master		CE	GD			
Barker	Buffalo Bayou	CE	GD	May 63 F		Oct 72 SWD R
Addicks	Buffalo Bayou	CE	GD	May 63 F		Oct 72 SWD R
Brazos Riv Master		CE	FWD	Jan 73		Mar 73 SWD R*
Whitney	Brazos River	CE	FWD	Jan 74 F		Apr 75 SWD
Aquilla	Aquilla Creek	CE	FWD	Aug 83 P	Sep 84	Dec 83 SWD AR
Proctor	Leon River	CE	FWD	Feb 74 F		Apr 74 SWD
Belton	Leon River	CE	FWD	Apr 76 F		May 76 SWD
Stillhouse Hollow	Lampasas River	CE	FWD	May 76 F		Jul 76 SWD
Georgetown	N. F. San Gabriel	CE	FWD	Dec 79 P	Mar 84	Jun 80 SWD R
Granger	San Gabriel	CE	FWD	Oct 82		Nov 82 SWD R
Waco	Bosque River	CE	FWD	Jul 73 F		Aug 73 SWD
Somerville	Yegua Creek	CE	FWD	Oct 73 F		Nov 73 SWD
Colorado Riv Master		CE	FWD			
Hords Creek	Hords Creek	CE	FWD	Sep 55		May 62 OCE AR
O. C. Fisher	N. Concho	CE	FWD	Jan 56		Dec 62 OCE AR
Twin Buttes (1)	S. Concho	BR	FWD	Jan 66 P	May 85	Sep 66 FR
Marshall Ford (1)	Colorado River	BR	FWD	Dec 79		May 80 SWD R/FR
Guadalupe Riv Master		CE	FWD	Oct 63		Jan 66 OCE AR
Canyon	Guadalupe River	CE	FWD	Mar 73 F		May 73 SWD
Rio Grande Master		CE	AD	Aug 66 F		Feb 67 OCE
Abiquiu	Rio Chama	CE	AD	Apr 82 U		Jun 82 SWD
Galisteo	Galisteo Creek	CE	AD	Mar 68 F		Apr 68 OCE
Cochiti	Rio Grande	CE	AD	Aug 78 F	Nov 84 U	Jun 81 SWD

STATUS OF WATER CONTROL MANUALS IN SWD
(Report Control Symbol DAEN-CWE-16) Revised: 1 January 1984

RESERVOIR	STREAM	OWNER	DIST	WATER CONTROL MANUAL SUBMITTED	SCHEDULED THRU FY 86	APPROVED
Jemez Canyon	Jemez River	CE	AD	Aug 66 F	Apr 84 U	Feb 67 OCE
Platoro (1)	Conjos River	BR	AD	Apr 64 F		May 64 OCE
Pecos Riv Master		CE	AD	Nov 77		Nov 77 SWD AR
Santa Rosa	Pecos River	CE	AD	Dec 79 F	Jun 84 U	Sep 81 SWD
Sumner (1)	Pecos River	BR	AD	Mar 82		Nov 83 SWD AR
Two Rivers	Rio Hondo	CE	AD	Jun 62 F		Jun 64 OCE

Note:
(1) = Section 7 project, flood control regulation by CE.
AR = Approved, comments to be answered.
F = Complete, comments have been answered and approved.
FR = Published in Federal Register.
P = Plan.
R = Revision or answer to comments.
R* = Returned without approval.
U = Update of existing approved manual.
GRDA = Grand River Dam Authority.
WCID = Wichita County Water Improvement District.
LCRA = Lower Colorado River Authority.
BR = Bureau of Reclamation.

SECTION V
HYDROPOWER GENERATION
AT
SOUTHWESTERN DIVISION PROJECTS

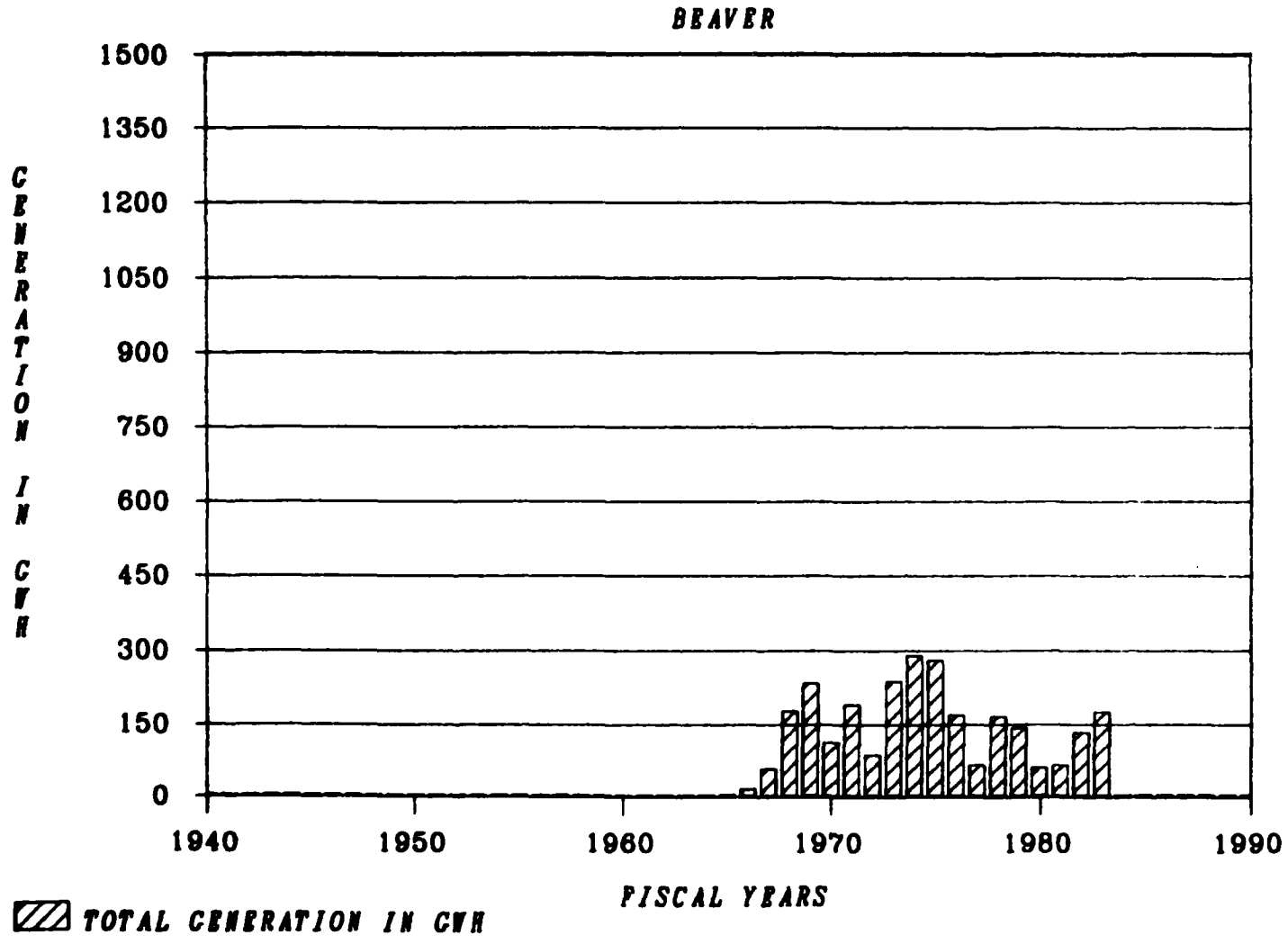
The 17 hydropower projects are listed in table 1. Generation by project for the last five fiscal years is shown in table 2. Generation by the projects, since impoundment, it shown on the graphs following table 2 and in the order in which they are listed.

TABLE 1

Project	Basin	Stream	No. Units	Total Capacity MW	Plate No.
Beaver	White	White	2	112	1
Table Rock	White	White	4	200	2
Bull Shoals	White	White	8	340	3
Norfork	White	North Fork	2	70	4
Greers Ferry	White	Little Red	2	96	5
Keystone	Arkansas	Arkansas	2	70	6
Ft. Gibson	Arkansas	Grand	4	45	7
Webbers Falls	Arkansas	Arkansas	3	60	8
Tenkiller Ferry	Arkansas	Illinois	2	34	9
Eufaula	Arkansas	S. Canadian	3	90	10
R.S. Kerr	Arkansas	Arkansas	4	110	11
Ozark-Jeta Taylor	Arkansas	Arkansas	5	100	12
Dardanelle	Arkansas	Arkansas	4	124	13
Denison	Red	Red	2	70	14
Broken Bow	Red	Mountain Fork	2	100	15
Sam Rayburn	Neches	Angelina	2	52	16
Whitney	Brazos	Brazos	2	30	17

TABLE 2
(Fiscal Year)

	1978	1980	1981	1982	1983
Beaver	139.9	58.4	63.0	130.6	173.2
Table Rock	575.2	312.0	93.3	384.0	680.2
Bull Shoals	882.2	466.9	185.1	400.9	1084.8
Norfork	277.8	166.5	56.1	116.9	260.9
Greers Ferry	367.7	135.9	61.3	134.1	344.8
Keystone	220.5	296.5	80.1	277.0	231.2
Ft. Gibson	213.2	155.8	71.5	239.9	216.2
Webbers Falls	229.8	186.4	0	0	91.3
Tenkiller Ferry	77.3	48.0	36.7	109.7	94.8
Eufaula	161.6	137.9	47.8	354.0	239.5
R.S. Kerr	488.3	482.3	170.2	613.8	577.9
Ozark-Jeta Taylor	234.4	320.2	65.0	0	134.7
Dardanelle	641.0	588.5	283.8	705.0	656.9
Denison	157.8	123.3	148.5	303.6	188.6
Broken Bow	207.4	122.1	132.3	163.0	194.7
Sam Rayburn	179.5	147.9	39.4	57.1	174.6
Whitney	63.8	23.8	49.7	104.2	28.5


BEAVER
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1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 1

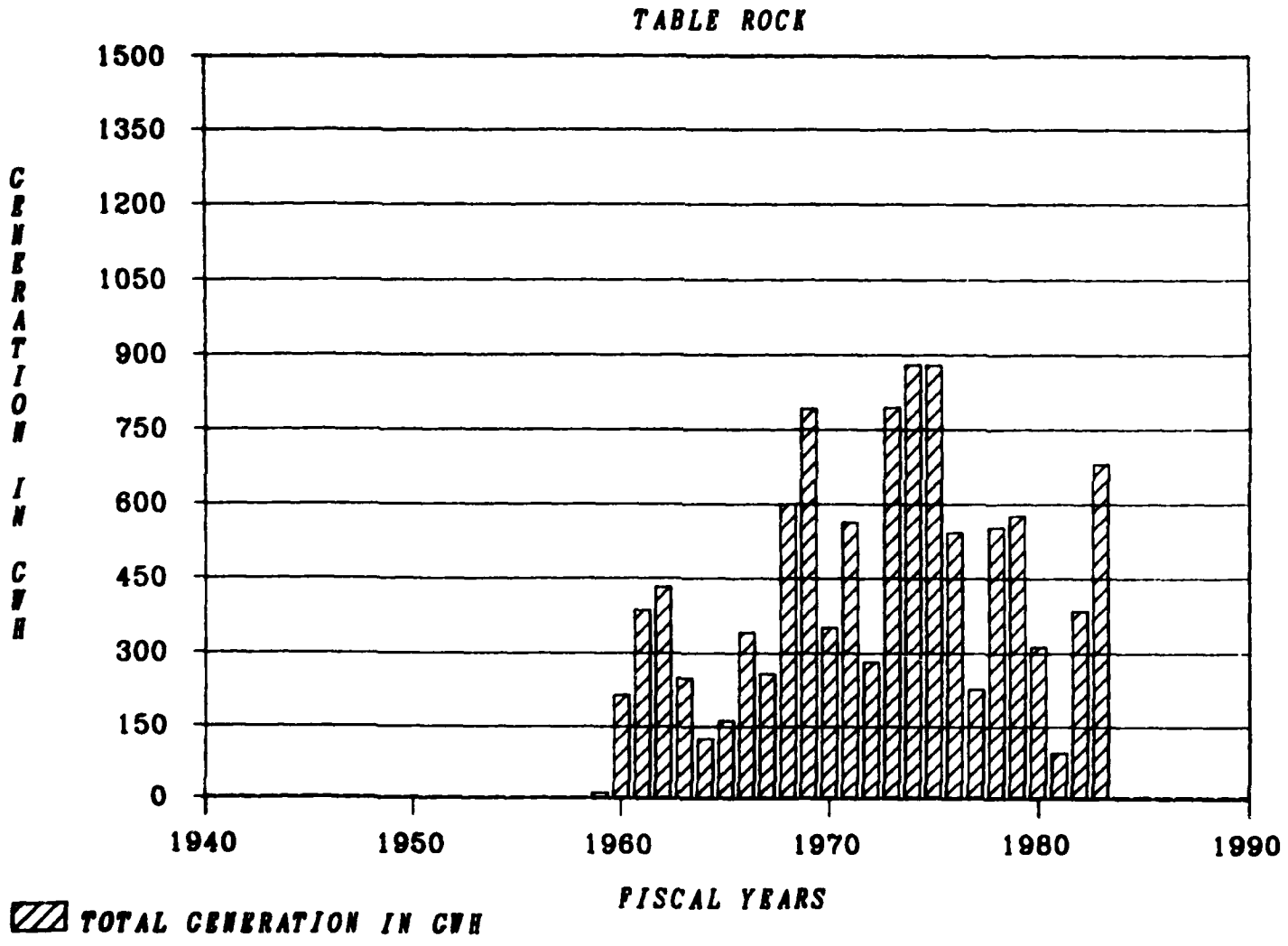
TABLE ROCK
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1050
900
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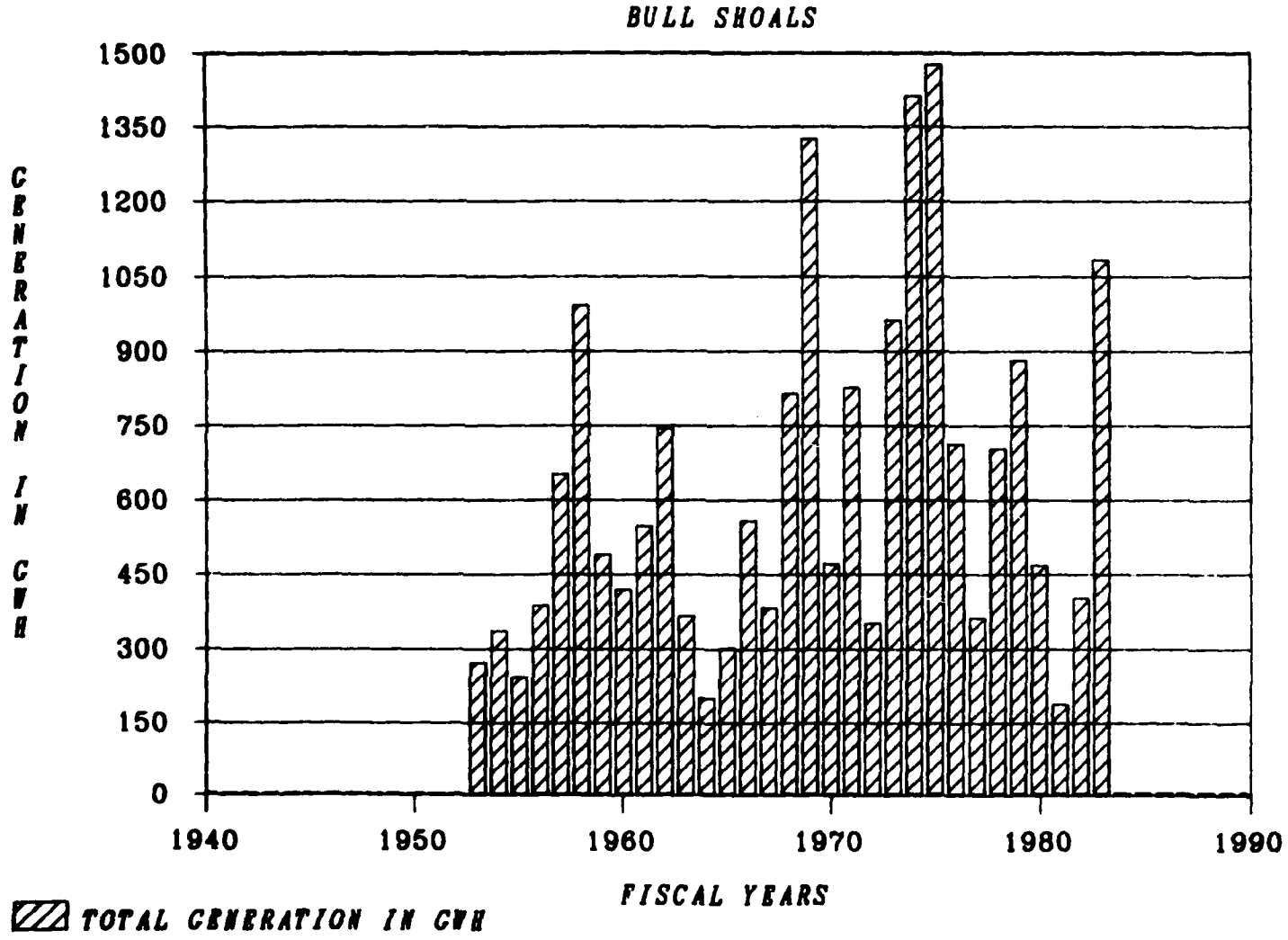
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 2


BULL SHOALS
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1200
1050
900
750
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150
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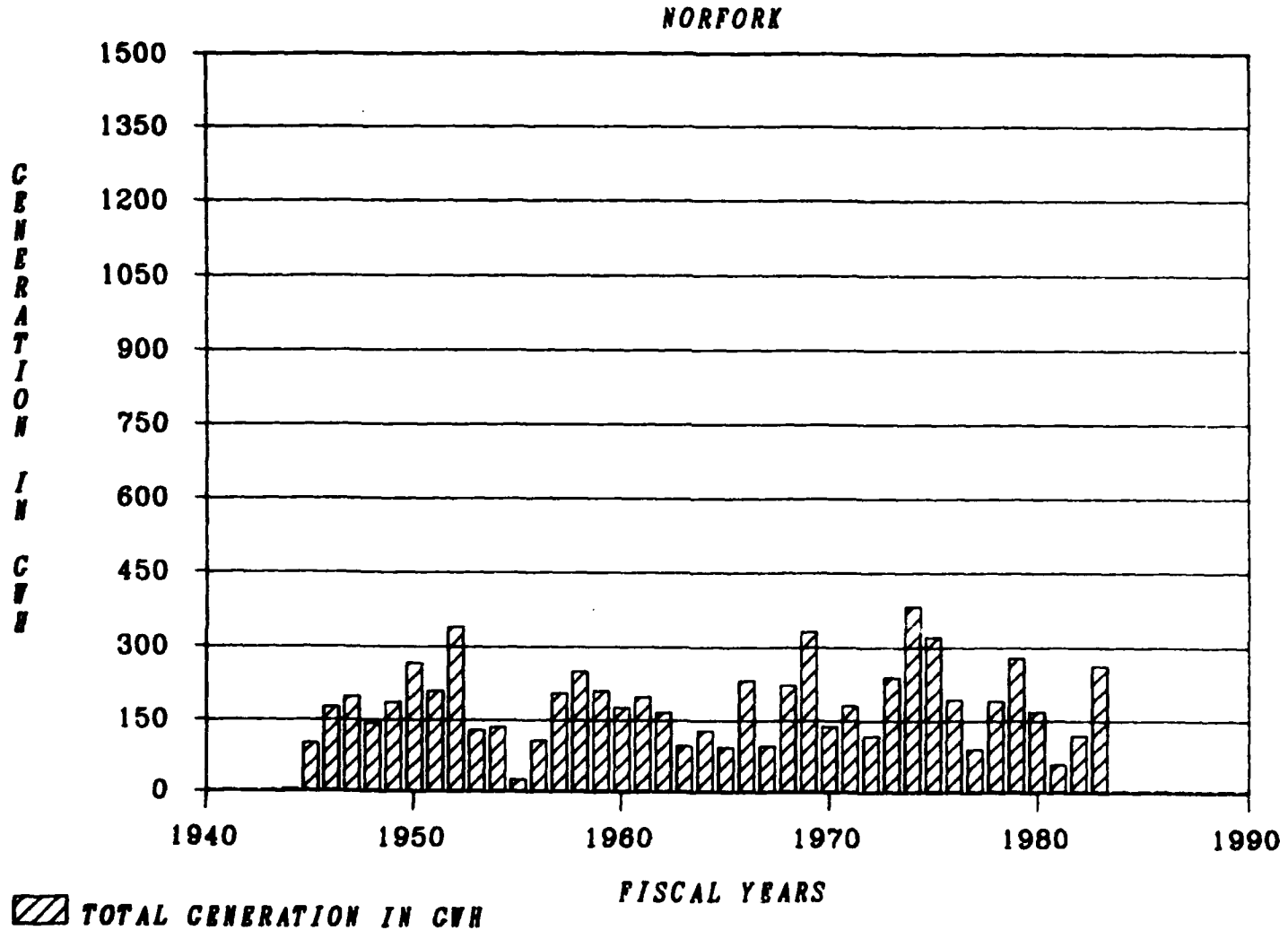
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 3


NORFORK
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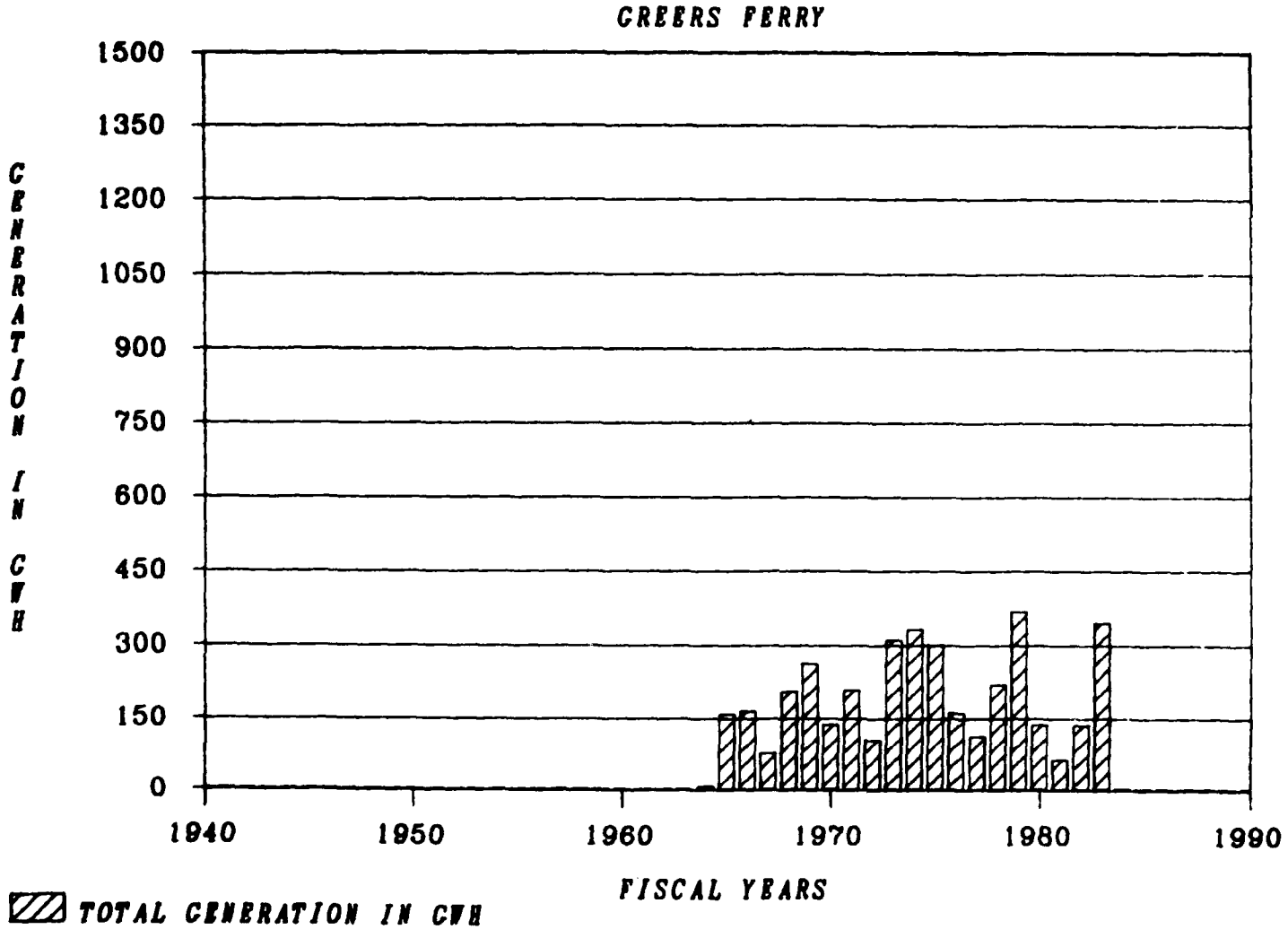
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 4


GREERS FERRY
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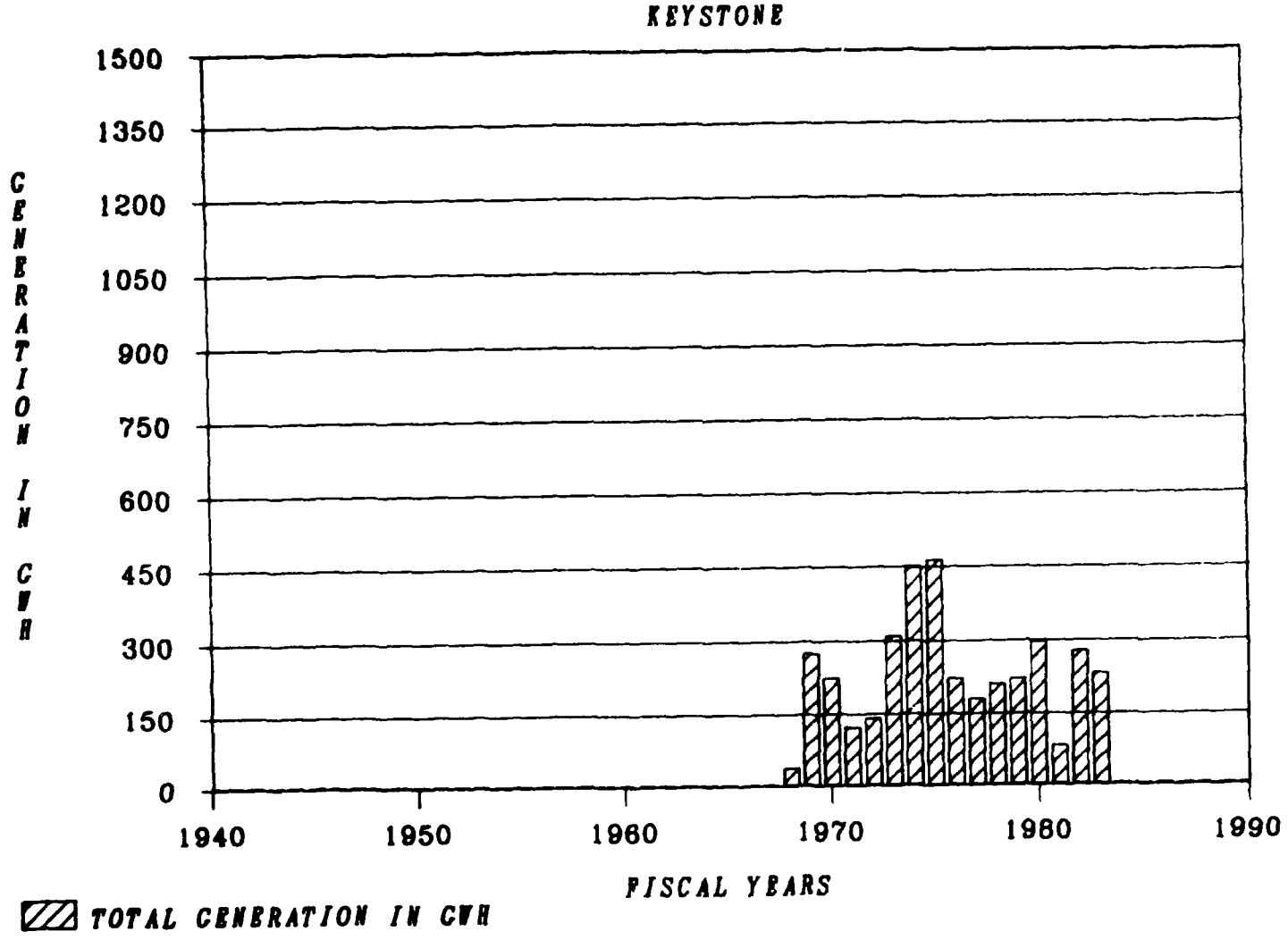
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 5


KEYSTONE
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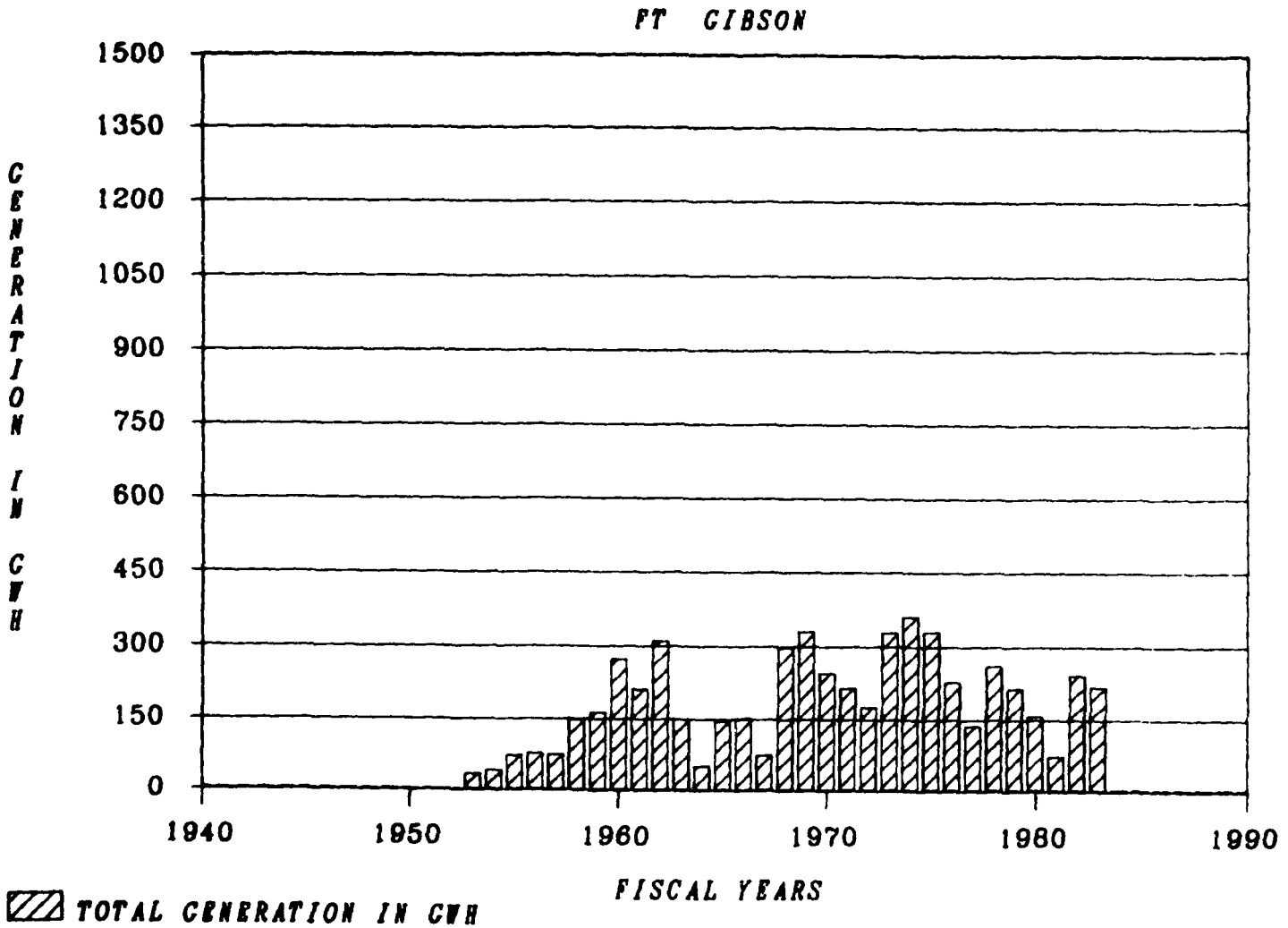
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 6


FT GIBSON
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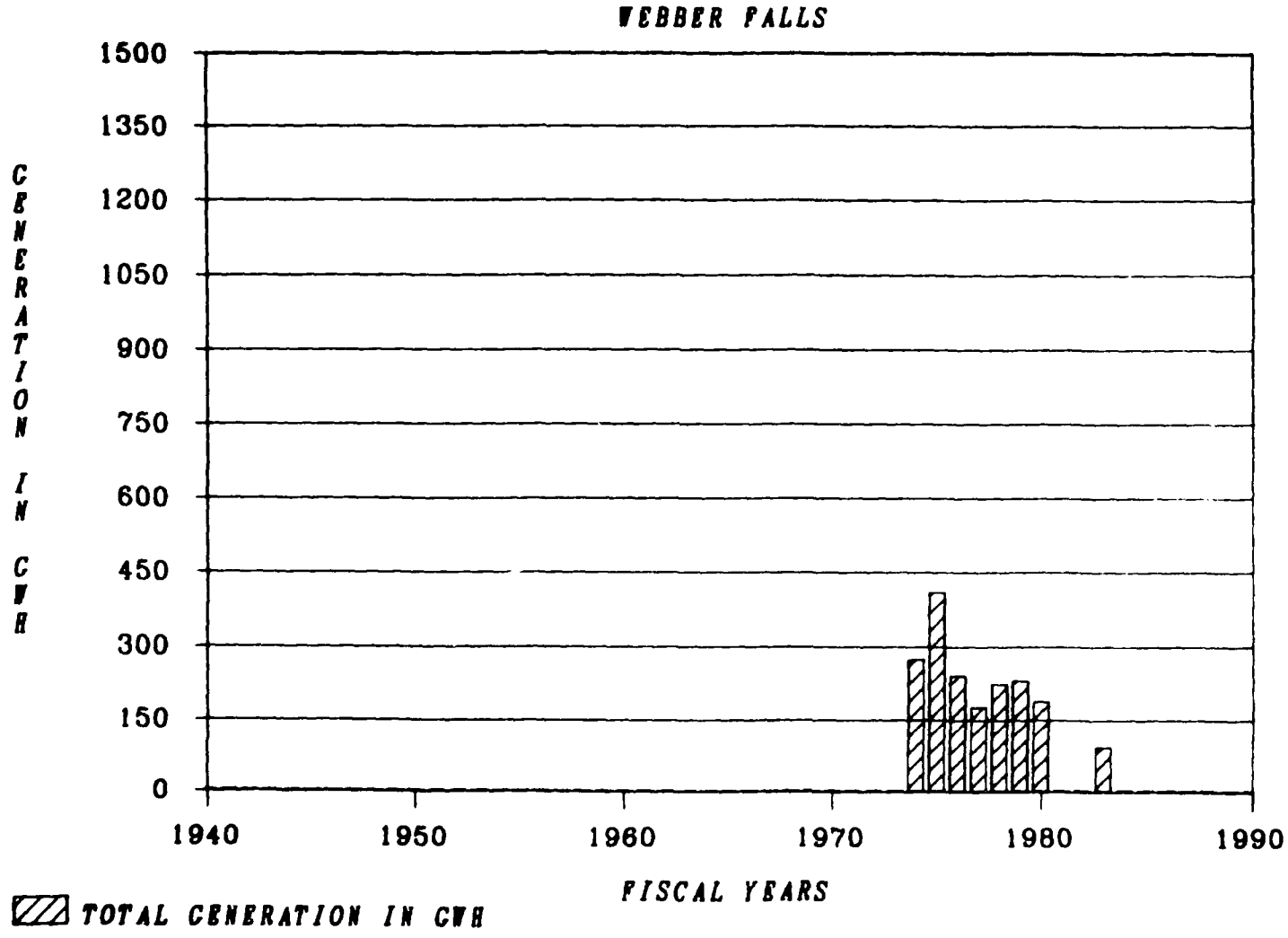
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 7


WEBBER FALLS
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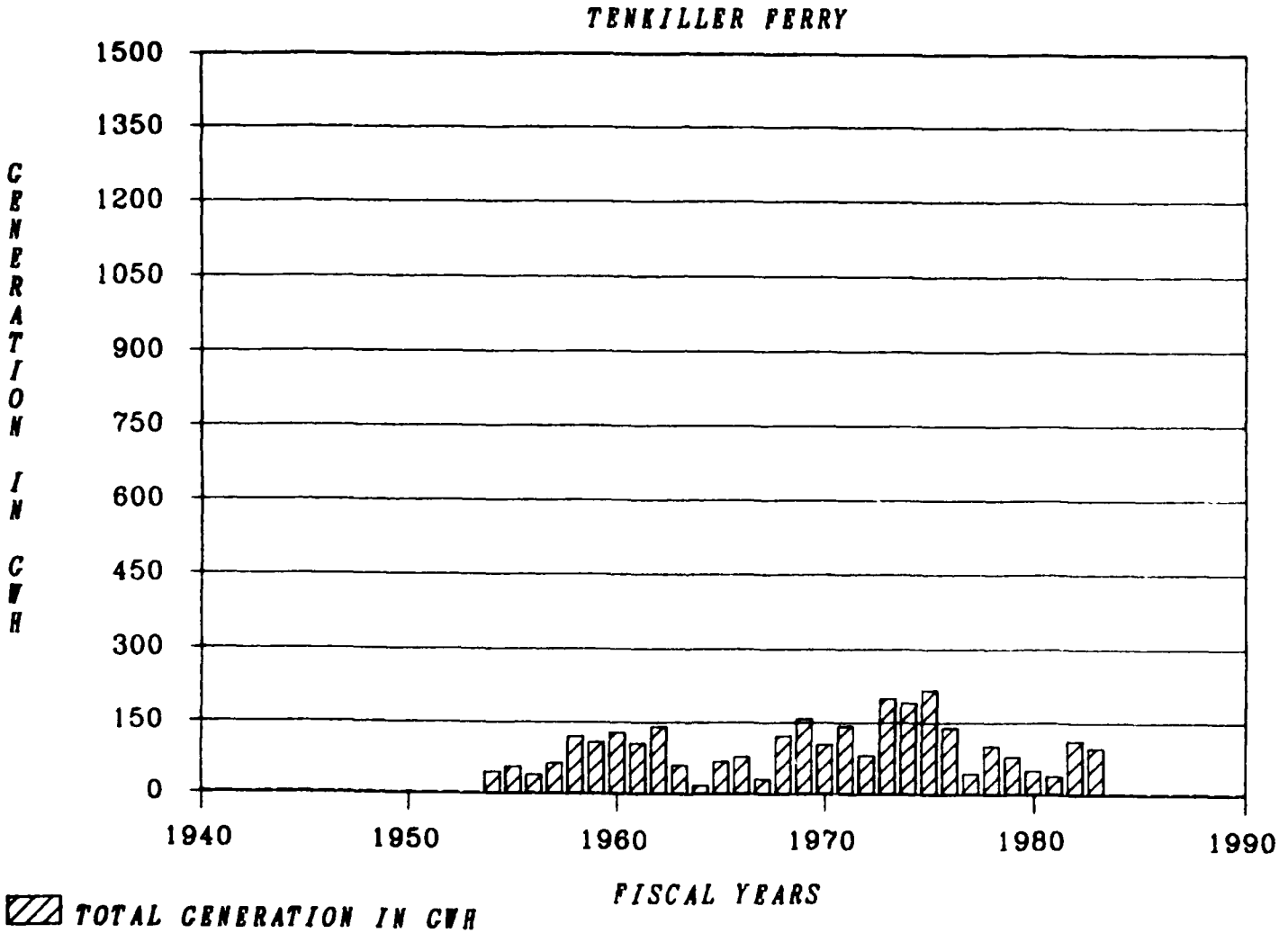
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 8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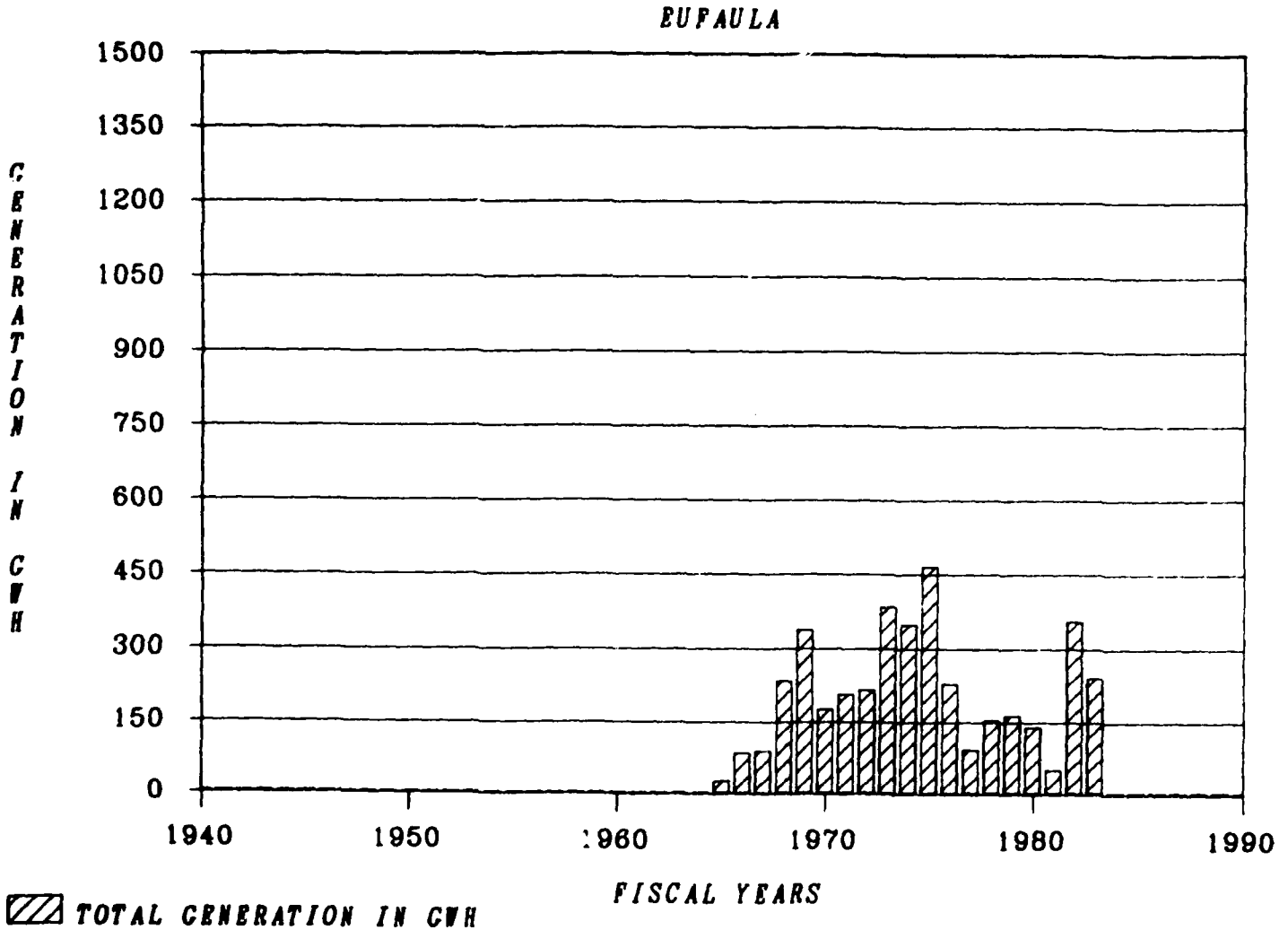
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 9


EUFAULA
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1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 10

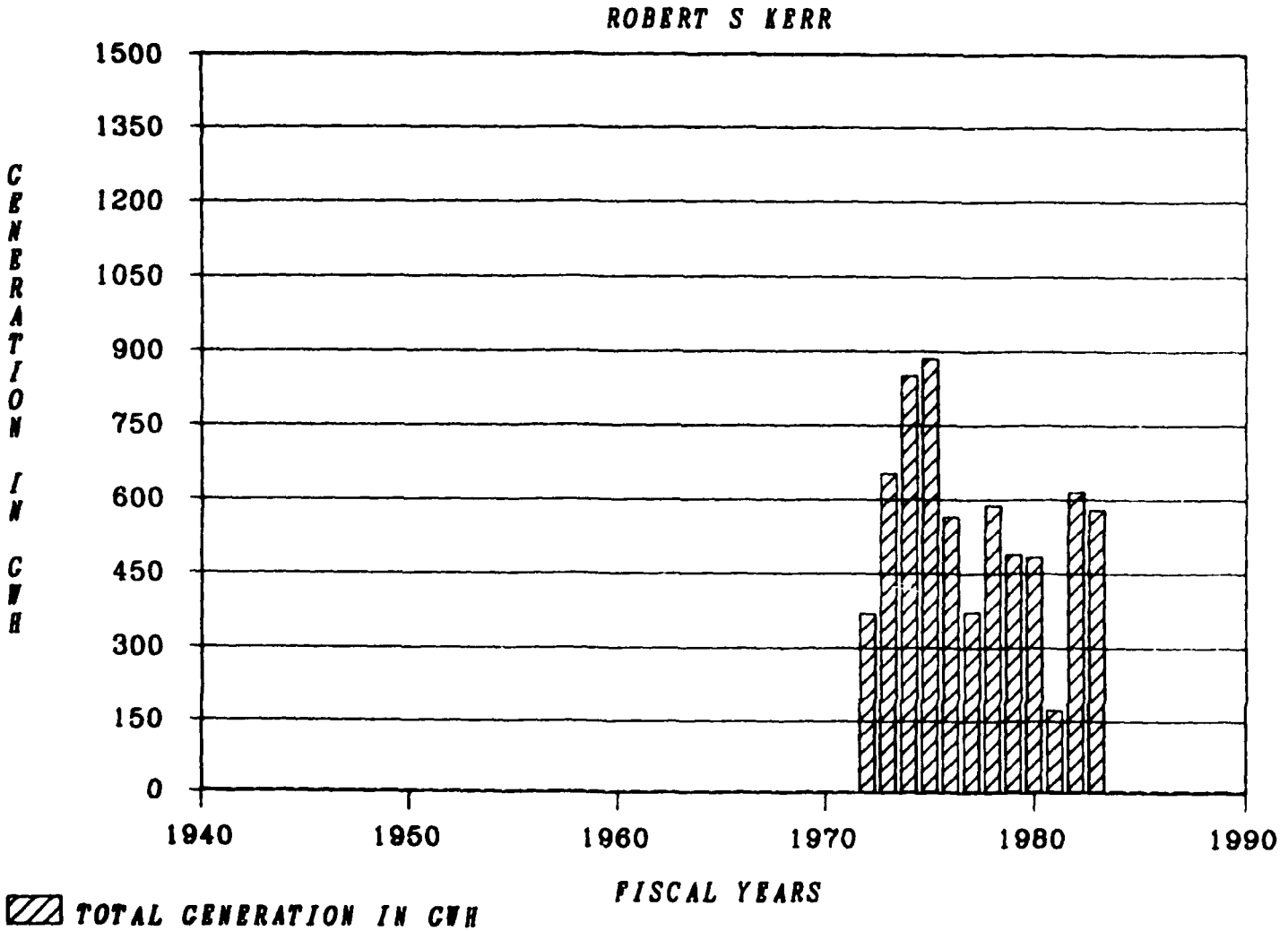
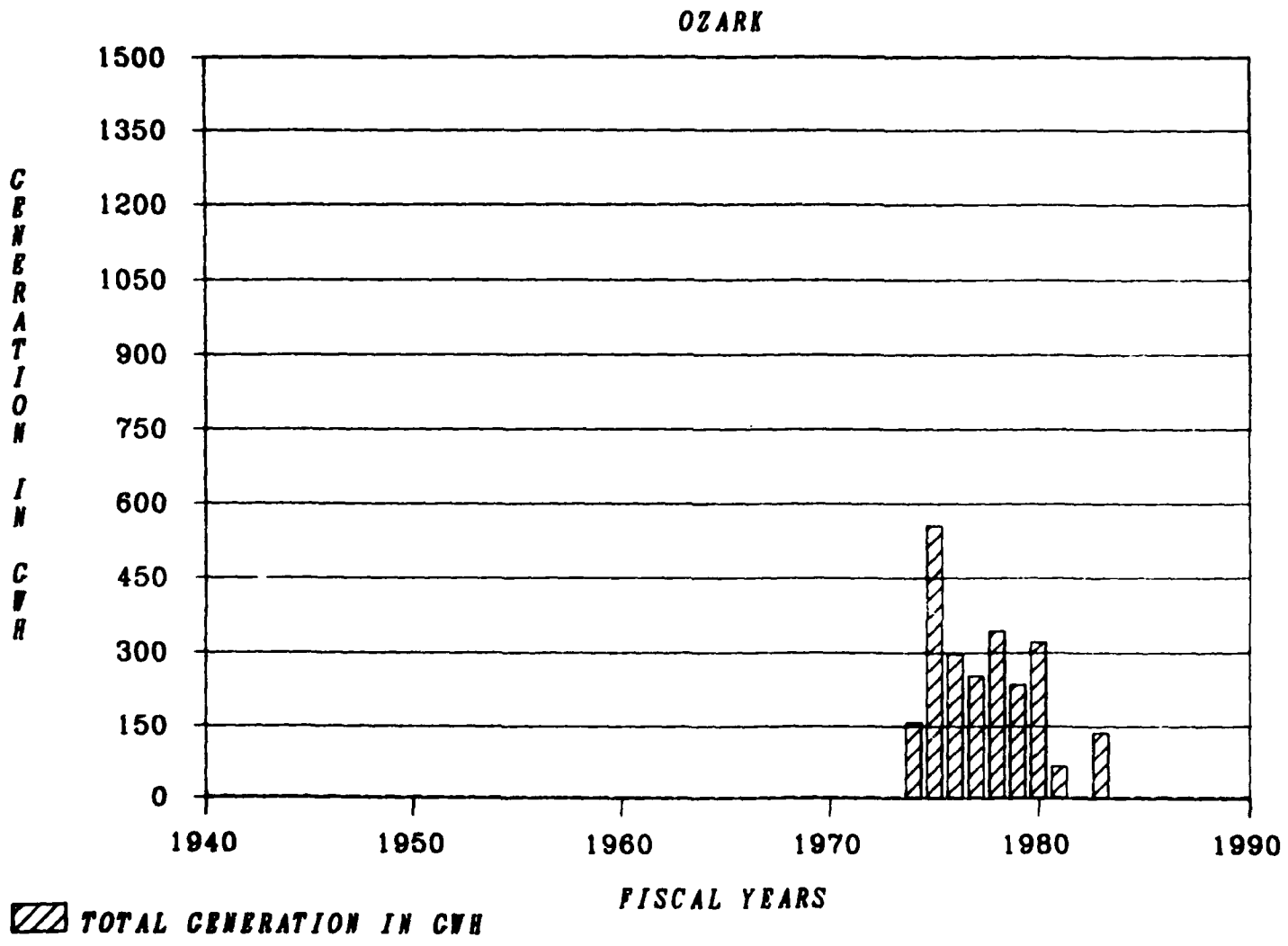

ROBERT S KERR
1500
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 11


OZARK
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1200
1050
900
750
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450
300
150
0
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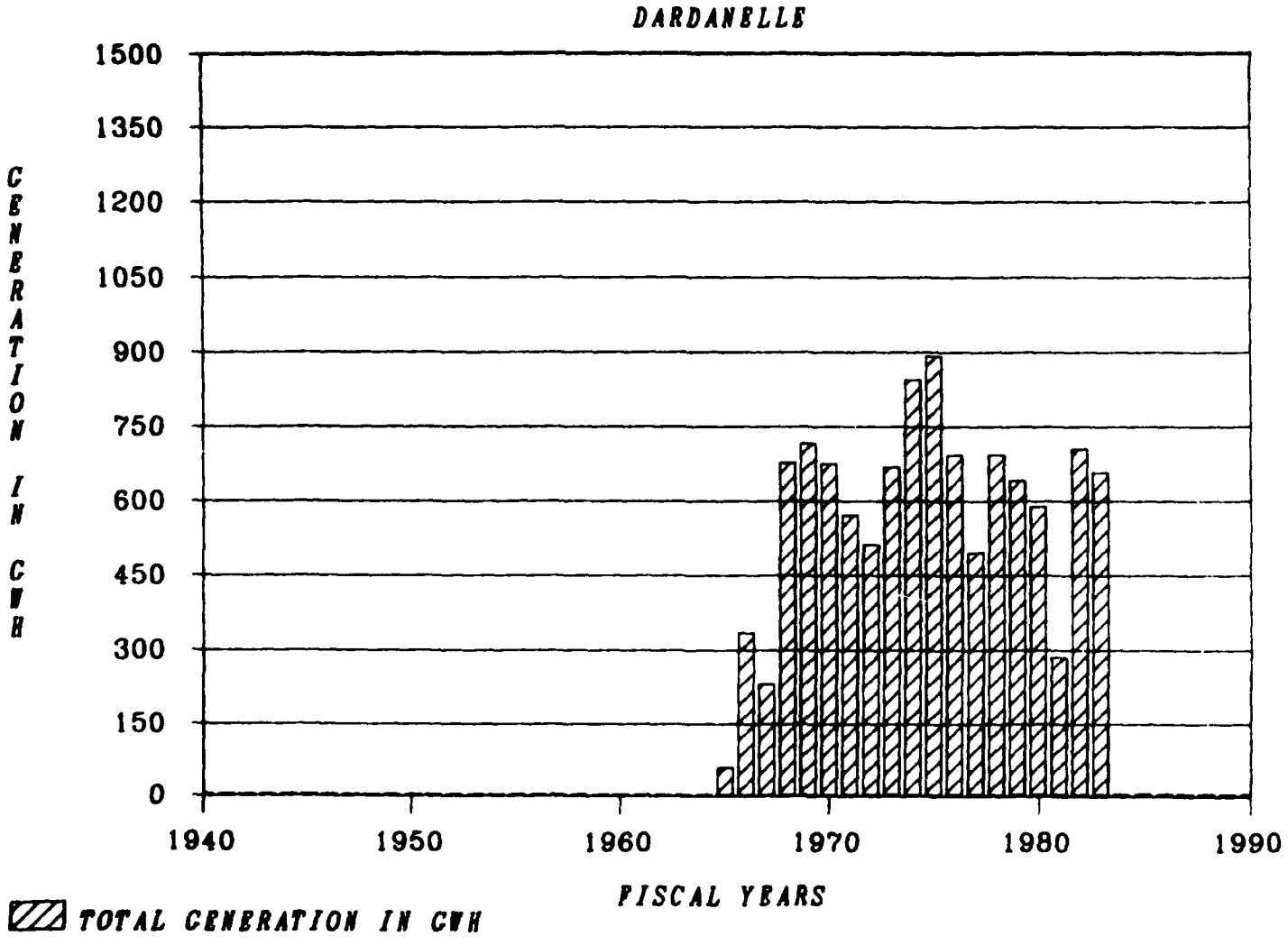
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 12


DARDANELLE
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1350
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750
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150
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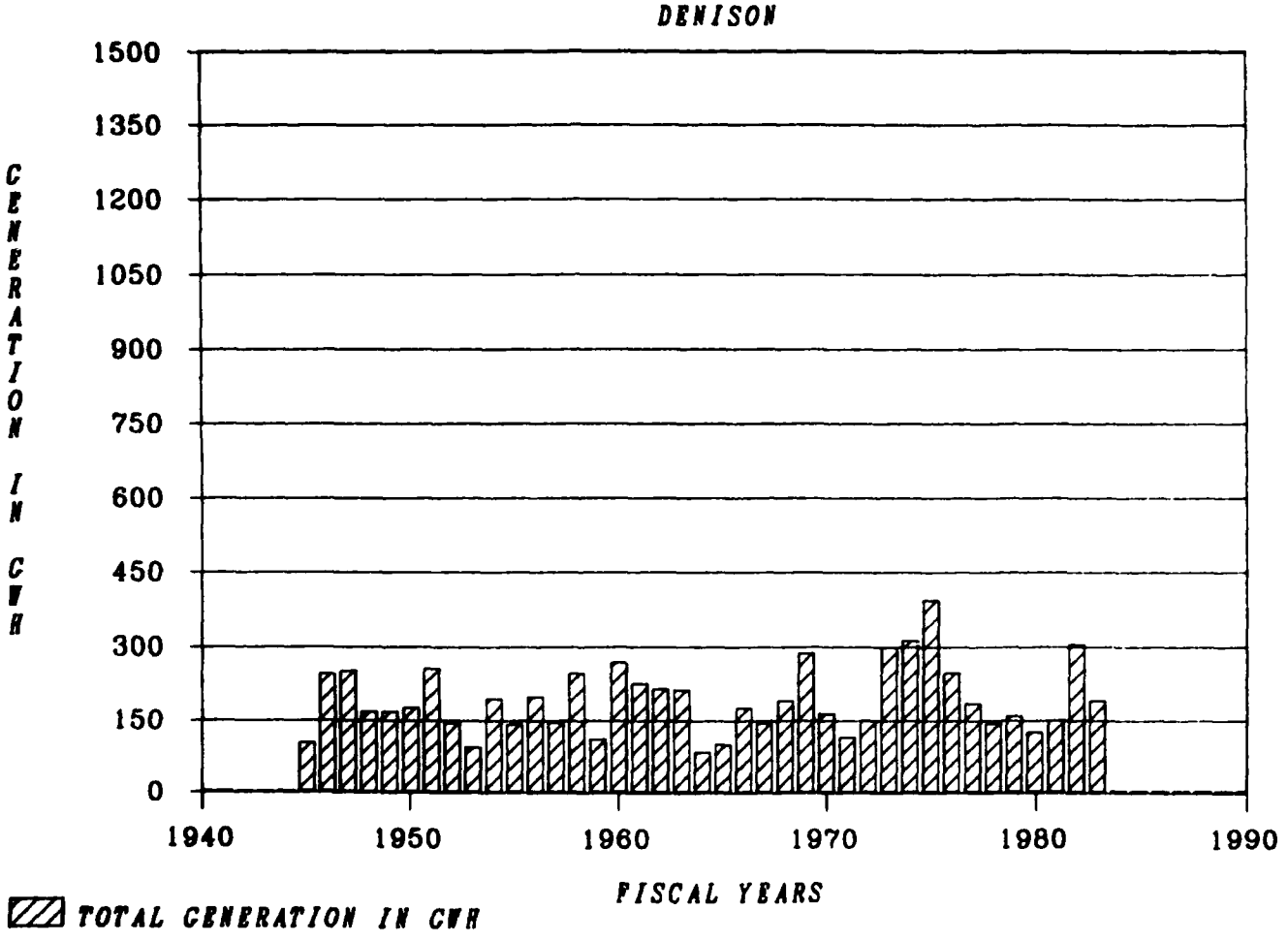
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 13


DENISON
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1350
1200
1050
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750
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150
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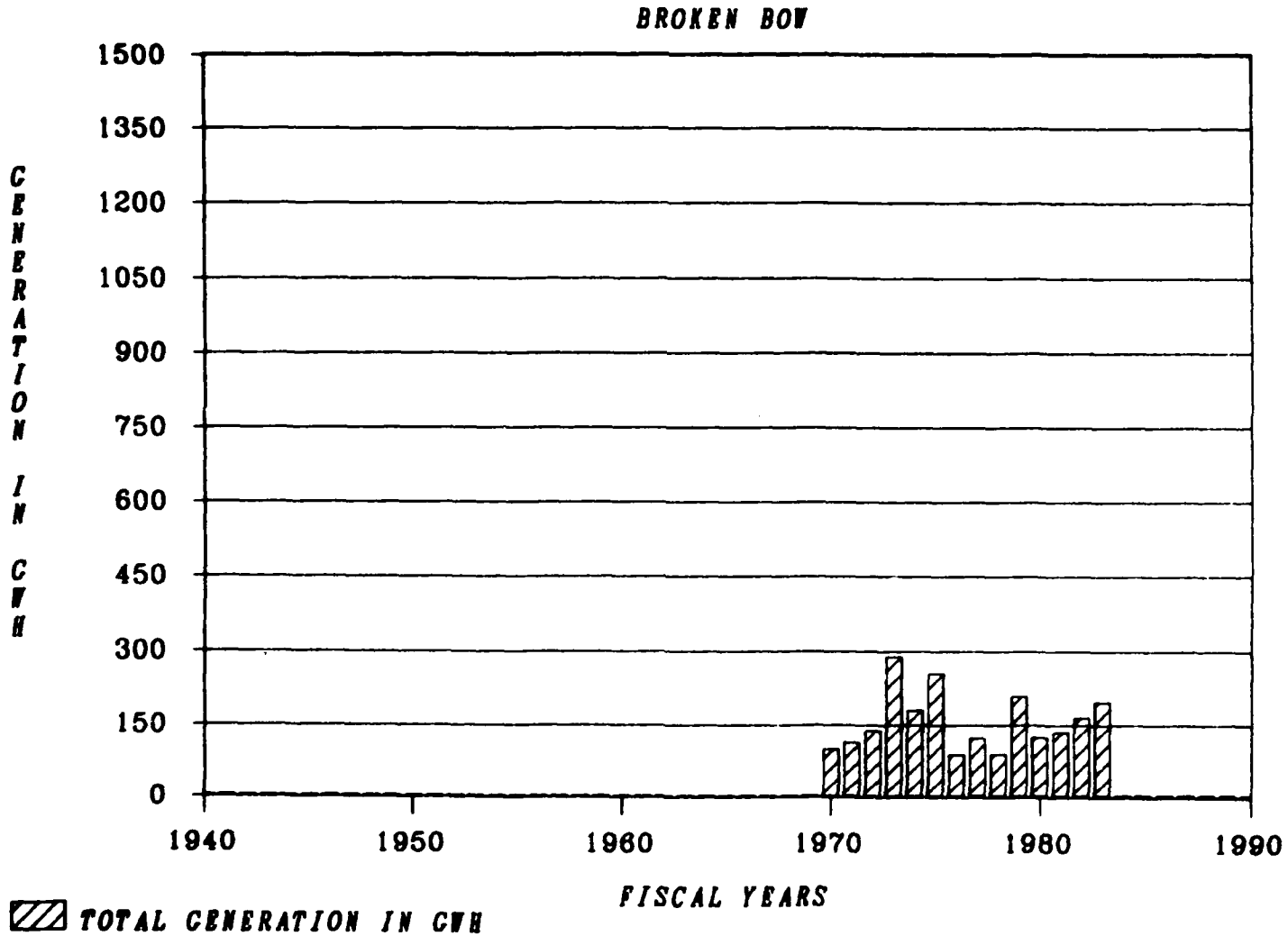
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 14


BROKEN BOW
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1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 15

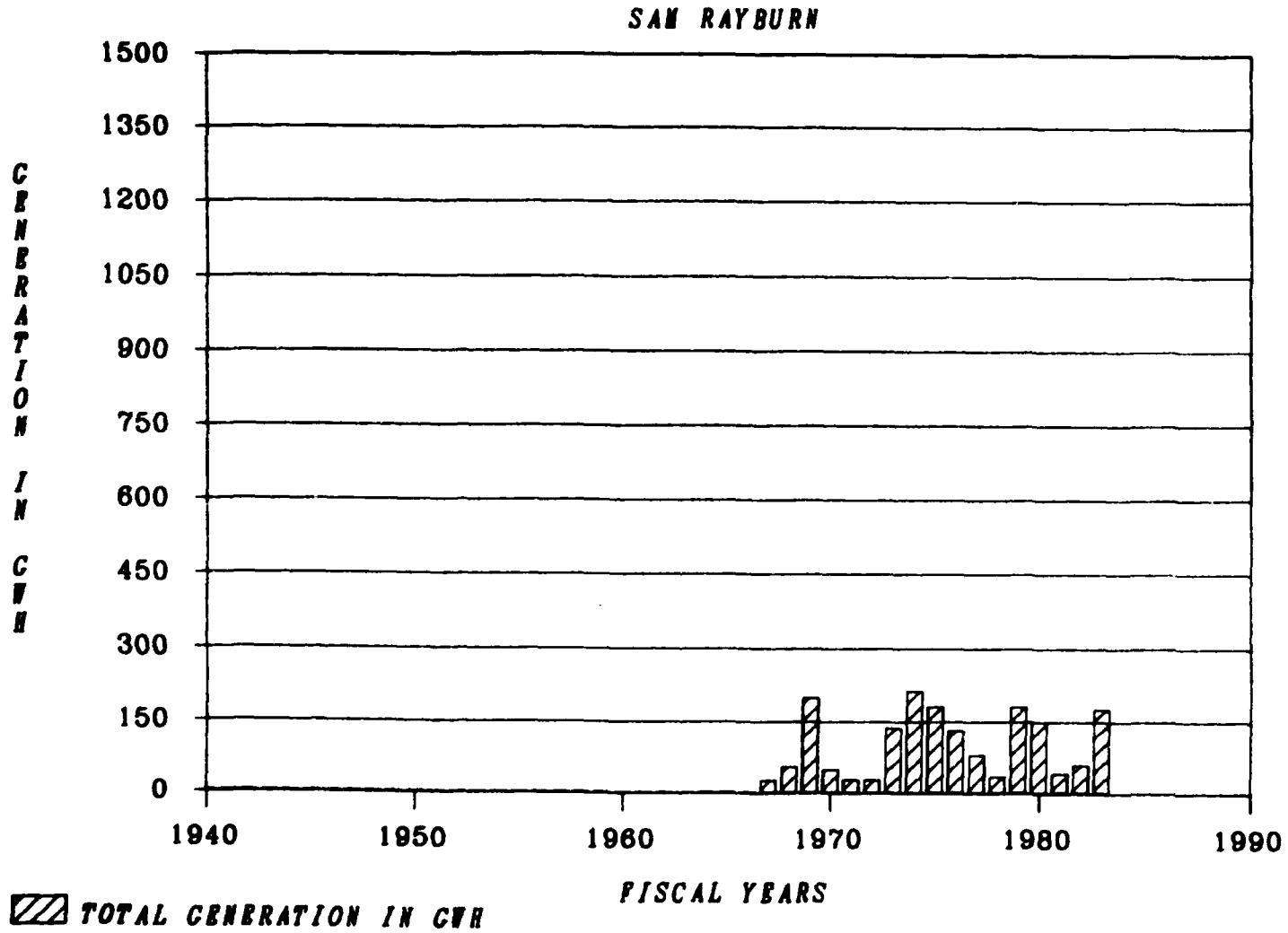

SAM RAYBURN
1500
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 16

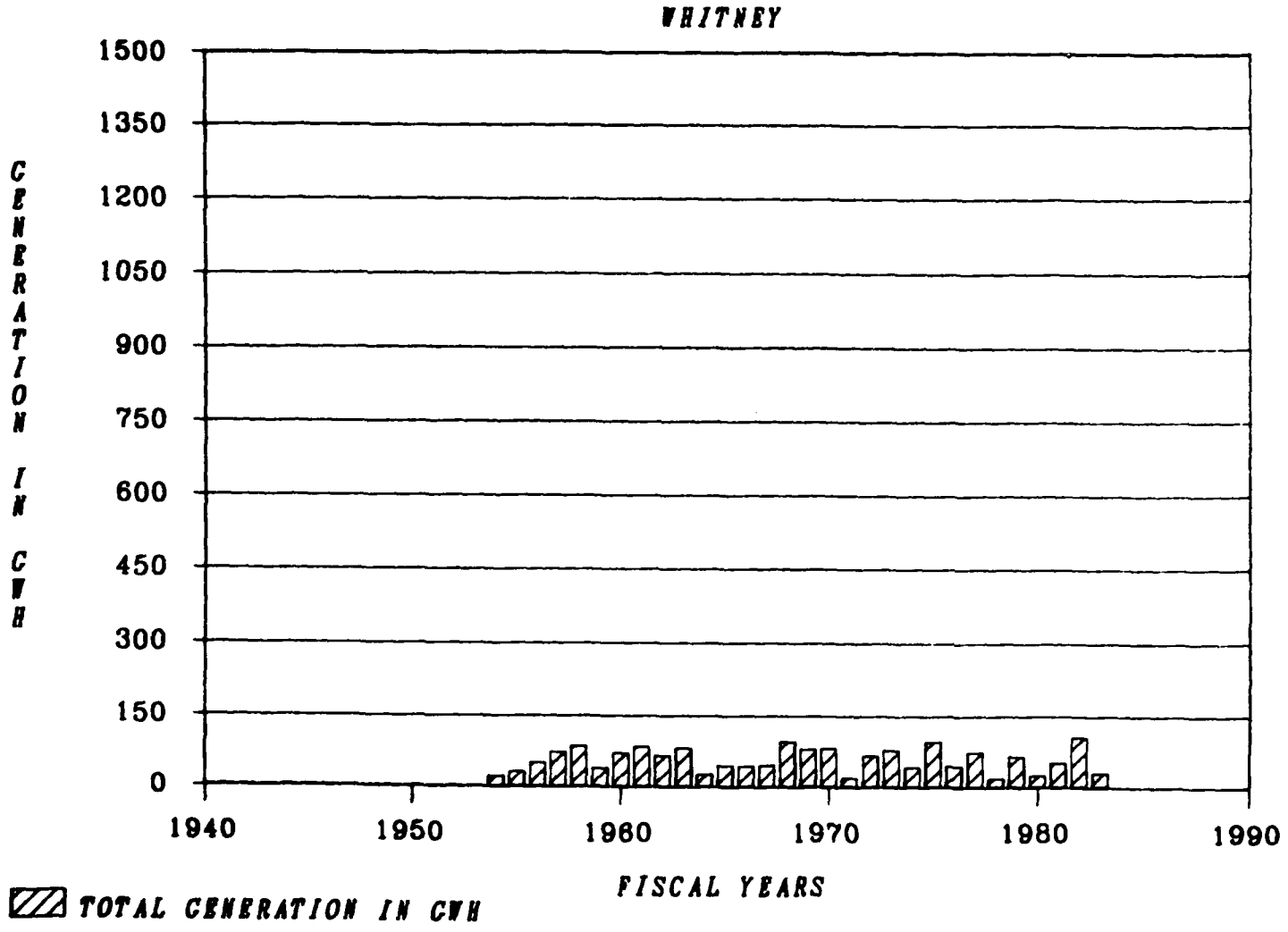

WHITNEY
1500
1350
1200
1050
900
750
600
450
300
150
0
GENERATION IN GWH
1940
1950
1960
1970
1980
1990
FISCAL YEARS
TOTAL GENERATION IN GWH

PLATE 17

SECTION VI - DISTRICT WATER CONTROL ACTIVITIES

1. Special Reservoir Operation.

a. Albuquerque District. Abiquiu Reservoir stored snowmelt runoff beginning 18 April and obtained a maximum pool elevation of 6213.89 (175,460 acre-feet) on 14 June. Approximately 15,000 acre-feet of flood water was carried over and will be evacuated prior to the end of the calendar year. Cochiti Lake stored snowmelt runoff between 21 April and 8 July with maximum pool elevation of 5348.70 (78,600 acre-feet) ocurring on 5 June. Pueblo Reservoir also had runoff storage between 16-29 June. Galisteo Reservoir had brief periods of storage on 30 July, 2 August and 14 September.

b. Fort Worth District. Flood control operations were sporadic during the past year. Eighteen flood control projects out of the district's total of twenty-two used part of their flood control storage during the year. There were nine requests for deviation from the district to the division. Runoff associated with Hurricane Alicia was minor, as less than one-half foot of rise in lake elevations were attributed to the storm. Notable project operations are discussed below:

(1) Construction of Aquilla Lake was completed in April 1983 and initial impoundment commenced on 29 April 1983. Below average rainfall and no significant major storms developed upstream of the watershed; therefore, the lake was not filled. As a result, the lake level has been fairly constant throughout the year with approximately 6,800 acre-feet or 13% of storage utilized in the lake.

(2) On the weekend of 23 through 24 October 1982, the reregulating lake of B.A. Steinhagen was lowered to elevation 53.0, 28 feet below its normal operating lake level of 81.0. However, no significant environmental impacts were attributed to the reduction in lake storage. An interim operation plan has been developed to monitor conditions that will minimize the possibility of lowering the lake in the future.

(3) Acquisition and installation of SWD's Ground Receive Station Site, located in Fort Worth, was completed by SWF at the termination of FY83. SWF will now have the ability to receive Data Collection Platform (DCP) field data from both east and west GOES satellites for Division wide application. The district installed 86 DCP's and purchased 15 automatic recording rainfall gages to establish criteria for real-time forecasting procedures.

c. Galveston District. The only special reservoir operation conducted at Barker Reservoir during FY 1983 was the closing of the reservoir gates during November to allow installation of six Type "A" relief wells at the outlet works.

d. Little Rock District. FY83 was an eventful year from the standpoint of magnitude and significance of flood events. Above average rainfall in late November 1982 primed the whole district for the flooding that occurred in December 1982. Record pool stages occured at DeQueen, Gillham, and Dierks Lakes and Greers Ferry reached its second highest pool of record. Several river gages experienced stages of record and at least 10 had recurrence frequencies exceeding 100 years. Below average rainfall in January and February provided an opportunity to evacuate most of the December flood storage before the spring rains of March, April, and May.

(1) Special operations or activities related to water control projects are summarized as follows:

(a) Little River System. Repair work on the stilling basin at DeQueen Dam was recently completed after a delay to evacuate flood control storage last winter and spring. Work is continuing on the stilling basin at Gillham Dam. All of the Tri-Lakes reached record levels in the December storm. DeQueen Lake crested at elevation 464.0 N.G.V.D., 65 percent full; Gillham crested at elevation 561.6 N.G.V.D., 83 percent full; and Dierks reached elevation 558.0 N.G.V.D., 101 percent full with a surcharge operation for several days. Millwood Lake reached elevation 269.2 N.G.V.D., 24 percent full, and its fourth highest stage. The Little River lakes experienced six rises during FY 83.

(b) Arkansas River System. High flows in December 1982 on the Arkansas portion of the basin produced a sediment-bearing recession which created several shoals and required extensive dredging. During the December rise 38 barges broke away from three different fleeting areas in Pool No. 2. Fourteen of the barges lodged against Dam No. 2 and blocked the flow through 12 of the 16 spillway gates. The incident caused the headwater to rise 7 feet and the right overflow embankment was overtopped. The spring rise in May and June 1983 also produced a sediment-bearing recession which created serveral shoals and required extensive dredging. During the spring rise all of the navigation pools except Lake Dardanelle and Ozark Lake were hinged to reduce shoaling in the upper pool reaches. Pools Nos. 2, 7, and 9 were hinged under special conditions to provide a minimum 9-foot depth over shoals that formed in those pools. The other six pools were operated under the 2-foot "automatic hinge." A tow grounded at mile 32 in June 1983 and sediment deposited such that the channel was completely blocked. Pool No. 2 was hinged 5 feet at the dam for 6 days. The scouring of the channel and advance of the dredge combined to reopen the channel, reducing the dredging cost about $100,000 and reducing the navigation delay by 2 to 3 weeks.

(c) White River System. The water management activities on the White River system were highlighted by a deviation to increase the rate of release of flood control storage in the late spring so that rate of release could be reduced sooner and improve the chances of a successful agricultural season along the middle and lower part of the White River. This deviation was the result of a meeting with farmers from that area. The White River lakes experienced three to five rises during FY83.

(2) Studies, reports, and investigations related to water control projects are summarized as follows:

(a) Table Rock Dissolved Oxygen deficiency is annually circumvented by restricting peak generation rates, making spillway releases, and injecting oxygen into the turbines. We began a test of oxygen injection into the station service unit in early FY83. However, the lake destratified prior to an adequate period and the results are inconclusive. Considerable effort has been expended in bringing the Table Rock Dissolved Oxygen study up to date and preparing a draft report. The draft report will be available for review in the second quarter of FY84.

(b) The White River Lakes Restudy has been underway since 1975 and is nearing completion. The draft report should be available in 1984. The study is not expected to recommend any significant changes in the functions or regulation of the projects.

(c) Hydropower studies in FY83 included submission of a Survey Report on Locks and Dams 2 through 6. Work was continued on the Preliminary Feasibility Report on two pump-storage projects and additional capacity at Dardanelle and Ozark. This report is scheduled for completion in FY84.

(d) The draft survey report on Norfork Units 3 and 4 was submitted to SWD in March 1983 and is currently being revised to incorporate those comments. Six alternatives were considered during the study, the the most feasible alternative is the addition of two conventional units similar in size and type to the two existing units.

(e) Nonfederal development of hydropower (Federal Energy Regulatory Commission permit/license applications) reviews were completed on 18 projects in the Little Rock District; 11 projects in the Arkansas River Basin (8 projects on the Arkansas River Dam 2, Locks and Dams 3, 4, 5, David D. Terry, Murray, 9, and 13; Lee Creek, Blue Mountain Dam, and Nimrod Dam); four projects in the Little River Basin (Dams at DeQueen Lake, Dierks Lake, Gillham Lake, and Millwood Lake); and three in White River Basin (White River Locks and Dams 1, 2, and 3). Licenses have been issued on Dam 2, and Locks and Dams 3, Murray, 13 and 9. Applications for licenses are pending on Dam 4, Locks and Dams 5, and 6 in the Arkansas River Basin, and Gillham Lake, and Millwood Lake in the Little River Basin; and White River Locks and Dams 1, 2, and 3 in the White River Basin.

(3) Other significant items relating to water management activities are as follows:

(a) Water Control Data System (WCDS).

The Harris 100 and 500 computers were installed, benchmarked, and tested in March 1983. Presently, Water Management Section personnel are utilizing applications software developed by LRD on the H500 to manually enter all daily reservoir data, perform water budget computations, and prepare the morning reports and the Arkansas River forecast. SWD WCDS software development is continuing with primary emphasis on system software to load the Total data base and to enable the H100 to communicate with the DCP downlinks, DARDC gages, project office Apple micro-computers, and other Harris sites.

DCP Status. During FY83 LRD purchased 74 DCP's, including 9 spares. We have 7 of these installed and operating, 32 are in various stages of becoming operational. The others are to be installed during FY84.

MOU with USGS. Little Rock District signed a Memorandum of Understanding with the USGS in Arkansas and Missouri to cover the installation and maintenance of DCP's and the Cooperative Stream Gaging program.

(b) Accoustic Velocity Meter.

An automated flow measuring station is being installed just downstream of Lake Dardanelle. The equipment, Accoustic Velocity Meter (AVM), was purchased in FY83 for $37,000 and the installation should be completed in early FY84. The installation is being performed by U.S.G.S. at a cost of $30,000. (This cost will vary with specific site and experience of the crew.)

With this equipment the insitu discharge is determined directly by measuring the time of travel for sound waves transmitted back and forth across the channel. In effect the water velocities are measured in horizontal slices instead of vertical slices as used in conventional current meter measurements. The AVM can be programed to sample the discharge at set interval, accumulate flows, and interface with the DCP equipment being installed in the WCDS for real time data. The channel components of the system can be arranged to negate the effects of backwater, changing flow patterns, and varying water depths.

The flexibility of the system should greatly improve our capability to determine actual flow rates under the constantly changing conditions created on the Arkansas River by gate changes, pool fluctuation, and variable backwater profiles. In general the system offers much promise for real time and effective gaging capability at troublesome backwater sites and at outflow sites for Corps dams. As an outflow station, a single AVM site should be much easier and cheaper to install and maintain than all the equipment that will be required to monitor individual gates, valves, and turbines and interface with the WCDS.

e. Tulsa District.

(1) Arkansas River Basin. Flows in the Arkansas River basin were about 11 percent above normal this year. Fifty percent of the annual volume pass Van Buren occurred during April and May. The peak flow at Van Buren was About 145,000 C.F.S.

Rainfall at all the Arkansas River basin projects was below normal this year. Rainfall amounts ranged from less than 0.5 inch below noraml at Big Hill Lake to more than 16.5 inches below normal at Tenkiller Lake. Most projects had from 8 to 10 inches less than normal rainfall. In Tulsa, this was the driest summer in recorded history, with only 2.70 inches of rainfall during June, July, and August, as compared with the previous low of 3.69 inches in 1956.

Only one navigation taper was made this year. It extended from early April to late July. The final portion of the taper was modified somewhat to provide navigable depths near Dam No. 2 while repairs to the spillway were being made. Closure of Copan Dam was made on 1 April and the pool filled to the interim conservation elevation (709.0) on 8 April. Special releases were made at Keystone Dam and at Robert S. Kerr and W.D. Mayo Locks and Dams for raft races at Tulsa and Fort Smith.

(2) Red River Basin. Lake pool elevations were one to two feet below normal at all the projects at the beginning of the fiscal year with the exceptions of Broken Bow (down 10 feet), Foss (down 13 feet), and Altus (down 12 feet). Inflows were slightly above normal on the lower Red River basin and from near normal to about 50% of normal in the upper Red River Basin. The fiscal year began and ended with below normal flows; whereas, above normal flows occurred in the winter and spring. The precipitation ranged from 5 inches below normal to 18 inches below normal in the basin. Arbuckle Lake recorded its second highest pool since impoundment in 1967 at elevation 881.31 on 18 May. Impoundment of Sardis Lake in the Kiamichi River basin began on 27 December and is being stage filled through 1985.

2. Water Quality Program and Activities.

a. Albuquerque District.

(1) The goals of the Albuquerque District water quality data collection program are to provide an accurate picture of lake conditions as to pH, turbity, temperature, and dissolved oxygen. Trends are monitored to show improvement or degradation of water quality and the data are used to identify public health, fish and wildlife problems.

(2) Readings are made on a monthly basis for the following parameters: surface pH, secchi disk, and dissolved oxygen and temperature at surface and one-meter increments to the bottom.

(3) This data is availabe in the District Operations Office. The following is a listing of sampling locations for each project:

WATER QUALITY SAMPLING LOCATIONS

PROJECT	LOCATIONS	NUMBER
Abiquiu	Chama inflow, Canones inflow, reservoir near dam, release	4
Cochiti	Bland canyon, reservoir near dam, release	3
Conchas	Conchas and Canadian inflow, reservoir near dam, irrigation headworks	4
John Martin	Arkansas inflow, reservoir near boat ramp, reservoir near dam, reservoir near Ft. Lyon Hospital, two Lake Hasty locations, release	7
Trinidad	Purgatoire inflow, reservoir near dam, reservoir near Carpios ridge	4
Jemez Canyon	Inflow, reservoir near dam	2
Santa Rosa	Pecos inflow, reservoir near dam, reservoir near asphalt pit, release	4

Biological samples are tested monthly at Abiquiu and occasionally at other projects. District personnel are trained in the use of a gas chromatograph to test for dissolved nitrogen. Tests at Santa Rosa are planned for hardness and sulfate to monitor effects of gypsum deposits in the reservoir. Samples of inflow and releases at two reservoir locations will be tested monthly.

b. Fort Worth District.

(1) The goals of Fort Worth District water quality data collection program are to collect water quality data at all the existing projects in order to establish base-line conditions, monitor subsequent changes and identify water quality problems and resolve same where possible.

(2) Summary of Activities.

(a) An intensive monitoring program was started in FY 1981 to comply with the "Southwestern Division Draft Regulations on Water Quality Activities at SWD Civil Works Projects". As a result of this program, base-line conditions at 17 of the 21 projects in the Fort Worth District were established. Intensive monitoring on the remaining projects will be accomplished by the end of Fiscal Year 1984.

(b) Available data indicates that there are no water quality problems or potential problems in any of the Fort Worth District Lakes surveyed at the present time. However, nutrient levels were noted to be high in the headwaters of Navarro Mills Lake.

(c) Water Quality Reports for Grapevine Lake and Lewisville Lake, which were submitted to the Division in September of 1982, have been approved by the Division. Water Quality Report for Navarro Mills Lake for FY 1983 has been submitted to SWD for approval. The Water Quality Report for Bardwell Lake is in progress and will be submitted to the Division as soon as it is completed.

(d) Hydrology and Hydraulics Branch personnel periodically conduct water quality studies as part of normal project efforts such as preparation of survey reports. One such related study completed was "an assessment of water quality in Little Cypress Creek and Black Cypress Creek watersheds, quality of water impounded by the proposed lakes on these watersheds and the outflow from these lakes."

c. Galveston District. The detailed report, Barker and Addicks Reservoirs, for the 3-year quality program to show the effects of the length of impoundment on quality and determine the release rates which produced the most improvement downstream, is nearing completion by the U.S. Geological Survey. A draft should be available during early FY84 with the final report available later in the year.

d. Little Rock District. The overall goal of the water quality management program is to improve or maintain water quality in the Little Rock District projects at the highest level possible, consistent with each project's purposes, design, and funding. The District water quality management programs are divided among various elements of the Construction-Operations and Engineering and Planning Divisions by functional missions.

(1) Construction-Operations Division Responsibilities. The Permits Branch has been given the responsibility for conducting the District water quality program for Construction-Operations Division. The branch is composed of a Permits and Water Quality Section and a Compliance and Data Collection Section. Since the regulatory functions of the branch closely parallel functions of the division's water quality management program, field activities are very conveniently and efficiently combined to implement the programs. This is primarily due to the related procedural and logistical requirements of both regulatory functions and water quality activities. These responsibilities include the following programs relating to water quality management.

(a) Lake Monitoring. General lake water quality monitoring of all Little Rock District lakes other than the main stem of the Arkansas River is presently performed three times per year on each lake at six to eight stations at various depths. The field work is done by USGS personnel under a Corps of Engineers contract. Approximately 26 parameters are measured to ascertain general lake water quality and to provide background data in abating water pollution. There are no State or other Federal programs which routinely provide these data on the reservoirs operated by the Corps. Data obtained are maintained in the Permits Branch and are available from STORET and annual USGS Water Resources Data Publications for Arkansas and Missouri. Data obtained are used to evaluate long and short term water quality changes, to identify pollution sources, and to properly manage lake water quality. Their evaluations include the identification of potential pollution sources so as to enable the Corps' influence to bear its persuasiveness in decision making processes of others. This will assist project personnel and District officials in assuring that best management practices are followed for erosion control in development around lake areas and that best available technology is applied where domestic and industrial wastewater discharges are allowed in district lakes. These findings are published in Water Quality Management Reports and annual updates for each project. The Greers Ferry and Table Rock Water Quality Management Reports have been published. At this time statistical analysis is being performed on data collected thus far (1974-present).

(b) Discharge Permit and Operational Monitoring. Monitoring of District wastewater treatment systems and othr NPDES discharges in Missouri and Arkansas is performed in accordance with NPDES permit requirements. The USGS obtains the necessary monthly samples and analyzes these for BOD, bacteria, and suspended solids. Operational monitoring performed twice weekly by the sewage treatment plant operators including pH, flow, chlorine residual, dissolved oxygen, and settleability. This program is conducted in accordance with Section 402 of the Clean Water Act and is implemented by the State of Missouri and EPA, Region VI, in Arkansas.

(c) Bathing Beach Monitoring. Monitoring is performed five times monthly by resident area personnel on district bathing beaches during the swimming season to insure safe bacteriological quality of lake waters. Samples are analyzed by the Missouri and Arkansas Health Departments free of charge. A central log containing results for all projects is maintained by the Permits and Water Quality Section. This program is administered in accordance with SWD Regulation 1130-2-9 and applicable State laws.

(d) Potable Water Monitoring. Potable water supplies of the District are tested for physical, chemical, and bacteriological quality to insure their adequacy and safeness. Bacteriological samples are collected by resident area personnel and mailed to the appropriate health departments, which presently perform the analyses free of charge. Permits Branch personnel collect samples for complete chemical analysis by the health departments on each new water supply and for periodic nitrate analysis thereafter. Data obtained are used in an annual sanitary survey and report forwarded to SWD for reporting to OCE. This program is conducted as per ER 1130-2-407 and applicable Federal and State drinking water standards for noncommunity water supply systems.

(e) Dredged Material Analysis. Periodically, a bottom sediment survey is performed at eight locations along the Arkansas River navigation project and less frequently at other locations on other District rivers and lakes. Sediment and water column samples are frozen and sent to SWD laboratory for sediment, water, and elutriate analyses. The purpose of this program is to detect potential effects of dredging operations on water quality. These operations include both commercial dredging under Corps permits and channel maintenance dredging performed under Corps of Engineers contract.

(f) Pollution Complaints and Hazardous Substance Spill. Permits Branch receives calls reporting instances of pollution and hazardous substance spills and coordinates these reports with appropriate Federal and State officials. On occasion, Branch personnel investigate these pollution complaints to verify existing conditions and determine effects on project operations. During oil and other hazardous substance spills, branch personnel participate in emergency containment and cleanup measures with Coast Guard and EPA officials and when so designated, act as the Federal on-scene coordinator for these two agencies. The LRD Oil and Hazardous Substances Pollution-Contingency and Spill Prevention, Containment and Countermeasure Plan was rewritten and updated as of August 1983.

(g) Special Studies. The Compliance and Data Collection Section, Permits Branch, routinely assists Engineering and Planning Divisions in obtaining samples and analyses for special water quality studies conducted by that division, such as for planning purposes. Coordination is also accomplished with studies being performed by other agencies such as EPA, State Pollution Control, Health Department, Soil Conservation Service, etc.

(2) Engineering and Planning Division Responsibilities. There is no specific organization for water quality studies within Engineering and Planning Division. Responsibility is assigned to the various elements based on the nature of the program or study.

(a) Lake Profile and Release Monitoring. Water quality data have been collected at Beaver, Table Rock, Bull Shoals, Norfork, and Greers Ferry Lakes since 1966; at Blue Mountain, Clearwater, and Nimrod lakes since FY81; and at DeQueen, Dierks, Gillham, and Millwood Lakes since April 1981. Presently, monthly profiles of pH, temperature, dissolved oxygen, and specific conductance are obtained from the five lakes, as well as a grab sample below each dam. Additional profiles are obtained from Table Rock Lake during critical times of the year. These data are used in the design of operating features needed for preventing or lessening water quality problems downstream of the dams. They also contribute to the water control management activities required to maximize dissolved oxygen concentrations in the fall releases from Table Rock and to maintain acceptable temperatures downstream of all lake projects from May through October. Hydraulics Branch is responsible for this program and data collection is contracted to USGS.

(b) Special Studies. The Planning and Hydraulics Branches periodically conduct water quality studies as part of normal project planning efforts such as preparation of survey reports, design memorandums, and environmental impact statements. Certain special water quality related studies are identified below:

Greers Ferry Lake Environmental Protection Study. The Planning Branch has completed a 208 Water Quality Management-type Study which also addresses solid waste disposal needs. Plans of improvements and their cost have been proposed for implementation by the area residents. The draft final report is being revised in response to comments from SWD.

White River Lakes Study. This study includes an evaluation of how the release schemes of Bull Shoals, Norfork, and Greers Ferry Lakes might be modified to minimize adverse water quality impacts downstream.

Taylor Bay Siltation Study. This study investigated the effects of suspended sediment on fishing in Taylor Bay near Augusta, Arkansas. The sources of the slit were identified and alternate solutions were developed. Funds are included in the FY84 budget to continue the data collection and develop a plan to reduce or eliminate sediment in Taylor Bay.

(3) Laboratory Capabilities. Water quality analyses performed at the District level are limited to the following capabilities:

(a) Field testing of water quality which may be conducted by Corps personnel includes dissolved oxygen, temperature, pH, specific conductivity, Secchi Disc measurements, and others using HRCH field test kits approved by EPA.

(b) A small laboratory located in Construction-Operations Division can perform the following analyses: dissolved oxygen, color, turbidity, alkalinity, hardness, and others using colorimeter methods for analyses.

(4) Data Management. Lake water quality data collected and analyzed by USGS are entered into WATSTORE and STORET, the computerized data management systems of the USGS and EPA, respectively. These data are also published in the annual USGS water resources reports for Arkansas and Missouri. Results of potable water, bathing beaches, NPDES, and other monitoring are kept in log books or files as appropriate. Special data collection results are contained in the reports dealing with the specific subject for which data were collected.

(5) Future Water Quality Management Program. It is planned to develop a comprehensive coordinated District Water Quality Management (WQM) Plan. Loss of key personnel spaces thus far has precluded this. The plan would assign responsibilities for the various aspects of the overall program and establish guidelines for assigning responsibility for new programs and studies. A District Water Quality Committee will hopefully also be established. It would guide the development of the WQM Plan, periodically evaluate the program, and help establish priorites for future work.

e. Tulsa District. The District plan to determine existing water quality at all operating projects was continued in fiscal year 1983. Funding constraints during the past 3 years have reduced the number of lakes which could be surveyed and only 19 of the 35 projects have been completed to date. Three projects; Toronto Lake, Newt Graham Dam, and Chouteau Dam were surveyed to establish base line water quality data during fiscal year 1983. During fiscal year 1983 the following studies were conducted:

(1) Waurika Lake - Finalized results of fiscal year 1982 study on flow augmentation were presented to the Oklahoma Water Resources Board. The study showed the original release schedule provided by the US Public Health Service was outmoded and a modified release schedule was provided. This schedule drastically reduced costs. The schedule was incorporated into the Water Control Manual and approved by SWD.

(2) Toronto Lake - This study is aimed at determining the suitability of the presently used water quality release schedule provided by the US Public Health Service in the 1960's.

(3) Newt Graham and Chouteau Lock and Dams - Water quality investigations at these two projects seek to determine the impact of irrigation withdrawals on the Verdigris River portion of the navigation system. Irrigation water rights have a higher priority than navigation water rights in Oklahoma and such flows may eventually hinder navigation during critical periods. These studies will provide information which may limit irrigation usage based on detrimental effects on water quality. Data analysis is continuing.

Minor fish kills were reported at Fort Gibson, Great Salt Plains, and Keystone Lakes. At Fort Gibson and Keystone, the fish kill involved primarily striped bass and was apparently caused by low dissolved oxygen. Temperature stress appeared to be the probable cause of the Great Salt Plains fish kill.

3. Sediment Program and Activities.

a. Albuquerque District. Galisteo Reservoir was resurveyed in August 1983 with revised area-capacity data scheduled for implementation in FY 1984. Jemez Canyon Reservoir is scheduled for resurvey in late 1983 with revised area-capacity also to be implemented in FY 1984.

b. Fort Worth District. Sediment activities consisted of normal routine studies in connection with hydrologic investigation studies. Funds for sedimentation resurvey of Navarro Mills Lake, Wright Patman Lake and B.A. Steinhagen Lake as approved in the FY 1983 budget, were transferred to Grapevine Lake Spillway's Emergency Repair Project.

c. Galveston District. No sediment work was conducted at either Barker or Addicks Reservoirs during 1983. Dredging in conjunction with navigation is shown in the followng table.

d. Little Rock District.

(1) Summary of Activities. Suspended sediment samples are collected at 17 stations. The 247 sediment ranges on the main stem of the Arkansas River are resurveyed as near annually as funds and survey workload permit. From October 1982 through September 1983, there were 143 ranges scheduled for resurveying; 26 resurveys were accomplished. The remaining 117 ranges which were scheduled for FY83 will be completed early in FY84. There are an additional 173 ranges scheduled for resurvey during FY84. This includes 22 ranges which are in the White River portion of the Arkansas River project. If the spring of 1984 has normal flows, only 111 of these ranges will be resurveyed. Fifty-six ranges on tributaries of the Arkansas River are resurveyed less frequently when appreciable deposits are suspected. About 50 index ranges out of 350 sediment ranges in the other 8 lakes are resurvyed at 10-year intervals. During the period from October 1982 through September 1983, sediment ranges on Clearwater Lake were resurveyed. No other resurveys are scheduled for FY84.

(2) White River Entrance Channel Model. The Entrance Channel Model is a physical, movable bed hydraulic model which has been constructed at Waterways Experiment Station (WES) to study the navigation depth problems which occur on the White River between its confluence with the Mississippi River and Lock and Dam No. 1. This reach of the White River serves as the entrance to the Arkansas River Navigation System. Design of the model began during November 1981 and construction was completed during September 1982. Adjustment and verification tests were completed in September 1983. Tests with additional construction works were initiated in October 1983.

NAVIGATION PROJECTS - DREDGING
(Cubic Yards)

Project	FY82	FY83 1/
Brazos Island Harbor	1,016,000	1,084,438
Cedar Bayou	687,000	---
Corpus Christi Ship Channel	8,623,605	3,456,686
Freeport Harbor	1,428,226	2,149,843
Galveston Harbor	8,309,783	---
Houston Ship Channel	---	960,000
Matagorda Ship Channel	7,849,138	1,690,550
Sabine-Neches Waterway	7,901,319	4,371,746
Texas City Channel	3,483,938	---
Trinity River Channel	687,000	---
SUBTOTAL	39,986,009	13,713,263
GIWW		
Sabine River to Galveston	1,426,684	3,880,065
Galveston to Corpus Christi	4,837,285	7,046,336
Corpus Christi to Mexican Border	474,979	2,004,334
SUBTOTAL	6,738,948	12,930,735
TOTAL	46,724,957	26,643,998

1/ Preliminary data subject to revision.

(3) Channel Maintenance. Maintenance dredging to maintain navigable depths amounted to approximately 1,545,000 cubic yards in FY83. All of this amount was removed from Pools Nos. 2, 3, 4, 5, and 7; Lake Dardanelle; and the White River Entrance Channel. This was an increase of about 736,000 cubic yards over the FY82 dredging requirements. Three Corps of Engineers fleets were used to clam small shoals in Pools Nos. 2, 3, 7, Lake Dardanelle, Ozark Lake, and the White River Entrance Channel. The Corps of Engineers dredge JADWIN was used at mile 32 in Pool No. 2. Four contract dredges and one contract clamshell were used during FY83. The high flows in December, May, and June caused shoaling at several locations along the Arkansas River portion of the navigation system. The channel was closed between Norrell Lock and Lock No. 3 for 4 days in December 1982 while the channel was checked for loose and sunken barges. The shoal at mile 32 stopped traffic from 7 June until 16 June 1983 at that location. The low stages on the White River Entrance Channel restricted navigation during the latter half of September and continued into FY84. The restrictions varied from day to day and involved the draft and sizes of tows. The maximum draft was 8 feet on 29 and 30 September. Navigation was restricted to daylight hours only from 12 September through 30 September 1983. Approximately 18 groundings exceeding 1 hour occurred in the Arkansas portion of the navigation system in FY83.

e. Tulsa District. During fiscal year 1983 the initial sediment range survey of Copan Lake was completed and new elevation- area-capacity data was developed. The detailed resurvey and pole monument installation at Marion Lake were also completed. Reconnaissance surveys were conducted on selected sediment ranges at Keystone Lake and John Redmond Lake. Resurvey of the sediment ranges and analysis of inflowing and deposited sediments in Big and Little Sallisaw Creeks, Robert S. Kerr Lock and Dam were conducted to aid in the study of possible navigation from the Kerr pool to Sallisaw, Oklahoma. A hydrographic survey was also performed on Lake Wichita and elevation-area-capacity data was produced for the project. The contract for the installation of pole monuments at Waurika Lake has been completed and a contract has been awarded for similar work at Fall River and Toronto Lakes.

Reservoir sediment data summaries showing the results of the last resurveys for Heyburn and Eufaula Lakes were submitted to SWD for preliminary review. Work on the historical sediment data for the Tulsa District has been completed and the interagency report is currently being published by USGS. Additional data was furnished for inclusion in the WATSTORE system. Suspended sediment samples were collected at 17 sites. The tapering of flows on the Arkansas River following flood periods in order to reduce shoaling problems on the McClellan-Kerr Arkansas River Navigation System was effective. About 145,000 cubic yards were dredged from the channel and turning basin at the upper end of the navigation project. Plans are being prepared to dredge about 150,000 cubic yards from the navigation channel at the Arkansas-Verdigris Rivers confluence.

4. Navigation Activities.

a. Galveston District. The consolidated statement of tonnage handled by ports and moving on the Gulf Intracoastal Waterway in US Army Engineer District, Galveston is shown in the following table for calendar years 1980 and 1981.

(SHORT TONS)

	CALENDAR YEAR 1980	CALENDAR YEAR 1981
1. Brownsville, Texas	2,569,697	2,810,018
2. Port Isabel, Texas	304,964	313,036
3. Corpus Christi, Texas	45,001,096	41,980,354
4. Freeport, Texas	20,131,067	23,357,106
5. Galveston, Texas	9,631,091	11,268,337
6. Houston, Texas	108,937,268	100,966,741
7. Texas City, Texas	25,948,936	27,852,242
8. Sabine Pass Harbor, Texas	949,404	1,063,238
9. Port Arthur, Texas	29,796,633	26,037,529
10. Beaumont, Texas	52,260,728	40,358,920
11. Orange, Texas	567,157	484,942
12. Port Lavaca-Point Comfort	3,991,089	4,148,664
13. Anahuac, Texas	41,665	25,276
14. Moss Bluff, Texas	207,471	196,402
15. Liberty, Texas	22,598	0
16. Clear Creek & Clear Lake, Texas	20,700	0
17. Double Bayou, Texas	48,554	26,136
18. Cedar Bayou, Texas	328,513	231,485
19. Colorado River, Texas	436,585	403,016
20. Sweeny, Texas	673,740	660,291
21. Palacios, Texas	85,862	100,293
22. Dickinson, Texas	19,275	23,275
23. Aransas Pass, Texas	9,113	9,953
24. Port Mansfield, Texas	13,432	115,874
25. Harlingen, Texas	623,292	655,127
26. Channel to Victoria, Texas	3,303,122	2,930,820
27. Chocolate Bayou, Texas	2,934,850	4,301,199
28. Johnsons Bayou	568,057	638,289
29. Rockport	181,694	210,055
30. Other Ports	0	173
TOTAL	309,607,653	291,168,791
Gulf Intracoastal Waterway, Texas: (Traffic on Waterway)		
Sec. 1. (Sabine River to Galveston)	41,976,730	43,092,704
Sec. 2. (Galveston to Corpus Christi)	21,142,516	22,692,629
Sec. 3. (Corpus Christi to Mexican Border)	2,388,221	2,231,464
TOTAL (1)	65,507,467	68,016,979

(1) Includes duplications.

b. Little Rock District. Projections indicate that about 8.2 million tons of commerce will be moved on the McClellan-Kerr Arkansas River Navigation System in CY 83. This represents a decrease of 1 percent from the CY 82 level. Commodities moved consisted of bauxite, iron and steel, chemicals and chemical fertilizers, petroleum products, coal, sand and gravel, crushed stone, soybeans, wheat, other grains, and miscellaneous commodities. Inbound movements increased by 27 percent and outbound movements decreased by 11 percent. A comparison of tonnage for 1982 and 1983 is shown in the following tabulation.

	1982 (Tons)	1983* (Tons)
Inbound	1,500,000	1,900,000
Outbound	4,600,000	4,100,000
Internal	1,600,000	1,800,000
Through	600,000	400,000
Total	8,300,000	8,200,000

*Estimated

c. Tulsa District. Commercial movements in Oklahoma are about 6 percent less than in 1982. Wheat and chemicals showed the greatest gain while coal was steady and iron, steel, and petroleum products slumped. The inbound-outbound tonnage ratio has increased to about 1:3 in 1983 from about 1:7 in 1977.

Repair of damage caused by a 29 May 1982 barge accident at W.D. Mayo Lock and Dam was completed at no cost to the government.

5. Cooperative Programs.

a. Albuquerque District. The cooperative stream gaging program with the U.S. Geological Survey covers 40 stations. Program cost for FY 1983 is shown in table VI-1. Total program cost for FY 1984 will be $197,730. The following is a summary of stations by river basin:

STATION SUMMARY

Basin	Stations		Total
	Stream	Reservoir	
Arkansas	5	2	7
Canadian	4	1	5
Rio Grande	13	4	17
Pecos	8	3	11

Note: 5 gages are not associated with project operation.

b. Fort Worth District.

(1) National Weather Service. Funds were transferred by the SWF to the NWS in the amount of $84,272 for FY 1983. Under ongoing programs the Corps

collects rainfall at project offices while the NWS collects all other rainfall reports and maintains weather stations, including those at Corps' projects. Rainfall summaries are transmitted to the Corps via teletype, telephone, and a daily computer printed map which displays current totals for reporting stations. Supplemental and accumulative storm total printouts are provided upon request. Additional hydrometeorological information was received from the NWS via the teletype circuits and AFOS. Radar scans were obtained on a Kavouras radar acquisition access and display terminal via a direct connection to the NWS Stephenville radar site (which covers the geographic area where the majority of the District's projects are concentrated) and via commercial long-distance telephone into NWS radar sites at Galveston, Hondo, and Brownsville, Texas, and into Oklahoma City, Oklahoma. Continuous up-dates are possible during storm periods.

(2) U.S. Geological Survey.

(a) General. The USGS performed operation and maintenance on all streamflow, lake level, sediment sampling and some water quality stations in cooperation with the District. In addition, they arranged for reporting of river stages during flood events, made supplemental flow measurements, and processed all published data.

(b) Funds. The Fort Worth District transferred to the USGS for the Cooperative Stream Gaging Program a total of $486,660 in FY 1983. Table VI-2 shows the number of stations, the types of funds for each of several groups of stations and both the USGS and the CE contributions toward the total station cost. Total program cost for FY84 will be $615,330.

c. Galveston District. Two cooperative programs are in extistence in relation to the operation of Barker and Addicks Reservoirs. The program with the U.S. Geological Survey provides the operation and maintenance for the gages that record streamflow and reservoir content data used in the operation of the projects. Program cost for FY83 is shown in table VI-3. The total program cost for FY84 will be $180,860. The program with the National Weather Service provides for the operation and maintenance of the precipitation gages and collection of data used in project operation.

d. Little Rock District. Approximately 202 rainfall and/or river stage reporting stations were operated by the National Weather Service and the Corps of Engineers in or near the Little Rock District. Of these, 117 stations are in the Corps of Engineers/National Weather Service program. The remaining 85 stations are operated solely by the National Weather Service within or near the Little Rock District. Six of these stations are airway stations that report at 6-hour intervals. Reports from these stations are used in forecasting streamflows for flood warning and operation of reservoir projects. The stream gaging data required by the district are collected under a cooperative agreement with the USGS. During the fiscal year, 110 stations were operated of which 75 were operated cooperatively and 35 were operated by the Corps of Engineers. The FY83 total cost for collection of streamflow and some sediment data was $477,740 of which $293,540 was transferred to USGS. Program cost for FY83 is shown in table VI-4. The FY84 cooperative program will cost $510,570 of which $364,170 will be transferred to the USGS.

e. Tulsa District.

(1) Stream Gaging Program. Much of the information required for water control, hydrologic investigation and design of our water resources projects results from the reporting and measurement of flow, water quality, and sediment provided by a cooperative stream gaging program with the U.S.G.S. During FY83 this cooperative program included 238 stations of which 34 were operated independently by the Corps of Engineers. The stream gaging program in the Tulsa District cost $774,640 in FY83 with $527,860 of this being transferred to the U.S.G.S. for operation of stations and data publication. Table VI-5 shows a breakdown of the program by class of funds used to finance the program. The total program cost for FY84 will be $957,620.

(2) Reporting Network Program. Real-time water control and investigation and design of our water resources projects requires the measurements and reporting of rainfall and evaporation data. These data are provided through a cooperative program with the National Weather Service. During FY83 the rainfall and evaporation program in the Tulsa District cost $113,693 through transfer of funds to the National Weather Service.

6. Annual Flood Damages Prevented.

a. Albuquerque District. The following is a listing of damages prevented by Corps and Section 7 projects during FY83.

Basin	Project	Damages Prevented ($1000's)
Arkansas	John Martin	0
	Pueblo	46.8
	Trinidad	0
Canadian	Conchas	0
Rio Grande	Abiquiu	22,658.9
	Cochiti	1,009.1
	Galisteo	0
	Jemez Canyon	0
	Platoro	0
Pecos	Santa Rosa	0
	Sumner	0
	Two Rivers	2,335.3

b. Fort Worth District. The following is a listing of annual flood damages prevented by both Corps and Section 7 projects.

ANNUAL FLOOD DAMAGE PREVENTED

PROJECT	DAMAGES PREVENTED FY83 $	CUMULATIVE BENEFITS THRU FY83 $
Bardwell	0	8,659,700
Belton	0	105,983,100
Benbrook 1/	0	48,303,500
Big Fossil	0	6,267,700
Canyon	0	49,624,100
Grapevine 2/	0	801,008,400
Hords Creek	0	937,200
Lavon	0	81,704,300
Navarro Mills	0	25,576,900
Pleasanton	0	115,000
Georgetown	0	2,511,400
Proctor	0	5,166,700
Sam Rayburn	17,048,000	67,576,400
O. C. Fisher	0	2,375,600
San Antonio	0	44,055,500
Somerville	68,700	30,423,400
Stillhouse Hollow	0	20,596,800
Waco	0	58,731,900
Whitney	0	131,516,200
Granger	0	5,721,900
Lake O' The Pines	0	6,139,000
Wright Patman	0	13,697,000
Marshall Ford	0	134,745,600
Twin Buttes	0	347,500

1/ Includes damages prevented by Fort Worth Floodway.

2/ Includes damages prevented by Lewisville and Dallas Floodway.

c. Galveston District. The flood damages prevented along Buffalo Bayou, by the Barker and Addicks Reservoirs, during FY83 were $116,000,000.

d. Little Rock District. Complete data for FY83 are not available at this time. However, damages prevented by existing Corps projects for the December 1982 flood event are completed and are shown as follows:

DAMAGES PREVENTED BY EXISTING LRD PROJECTS
DURING DECEMBER 1982 FLOOD ($1000's)

Category	Arkansas River Basin	Little River Basin	White River Basin	Total
Non-Agricultural				
Urban	135.6	--	13,460.3	13,595.9
Other*	1,278.0	1,507.0	26,481.4	29,266.4
Argicultural	1,046.0	250.4	10,363.9	11,660.3
TOTAL	2,459.6	1,757.4	50,305.6	54,522.6

*Include such items as damages to roads, bridges, fences, farm equipment, farm storage sheds, etc.

e. Tulsa District. Flood damages prevented by Tulsa District lakes amounted to $32,670,000 during FY83. The cumulative total of flood damages prevented at all lakes total $719,623,000. The following is a breakdown of flood damages prevented for all lakes in Tulsa District including the non-Corps Section 7 lakes.

FLOOD DAMAGES PREVENTED BY COMPLETE AND
ESSENTIALLY COMPLETED PROJECTS - TULSA DISTRICT

ARKANSAS RIVER BASIN	FY 1983	THRU 30 SEP 1983 CUMULATIVE
	$	$
Big Hill	24,000	24,000
Birch	887,000	1,587,000
Canton	95,000	6,475,000
Cheney	74,000	7,014,000
Copan	4,572,000	4,962,000
Council Grove	1,978,000	10,968,000
El Dorado	48,000	48,000
Elk City	259,000	36,529,000
Eufaula	448,000	40,748,000
Fall River	976,000	28,386,000
Fort Gibson	162,000	29,487,000
Fort Supply	-	3,060,000
Great Salt Plains	-	13,240,000
Heyburn	97,000	4,237,000
Hulah	7,882,000	67,872,000
Kaw	391,000	10,241,000
Keystone	111,000	86,146,000
Marion	441,000	26,571,000
Markham Ferry	74,000	5,564,000
Norman	496,000	3,126,000
Oologah	1,784,000	41,124,000
Optima	-	7,000
Pensacola	175,000	38,845,000
John Redmond	3,360,000	55,200,000
Sanford	-	6,000
Skiatook	2,359,000	3,499,000
Tenkiller Ferry	46,000	11,366,000
Toronto	778,000	24,408,000
Wister	2,313,000	58,823,000
TOTAL ARKANSAS BASIN	$29,935,000	$619,668,000
RED RIVER BASIN		
Altus	-	3,260,000
Arbuckle	44,000	374,000
Broken Bow	705,000	10,715,000
Clayton (Sardis)	267,000	1,257,000
Denison	-	57,590,000
Fort Cobb	-	300,000
Foss	-	830,000
Hugo	278,000	5,678,000
Lake Kemp	-	2,930,000
Pat Mayse	243,000	3,513,000
Mountain Park	-	390,000
Pine Creek	793,000	8,723,000
Waurika	405,000	4,395,000
TOTAL RED BASIN	$ 2,735,000	$ 99,955,000
GRAND TOTAL	$32,670,000	$719,623,000

7. Lake Attendance.

a. Albuequerque District. The following is a listing of attendance for Section 7 and Corps projects in the Albuquerque District.

Project Attendance in Thousands

Project	Year 1979	1980	1981	1982	1983
Abiquiu	104.2	406.1	161.8	233.0	298.5
Cochiti	768.0	496.9	335.7	429.0	498.9
Conchas	189.7	437.5	258.6	159.0	268.6
Galisteo	10.2	2.7	3.1	3.0	5.2
Jemez Canyon	39.6	35.9	31.4	10.0	20.2
John Martin	250.2	670.2	522.9	613.0	639.5
Santa Rosa	---	5.1	59.7	109.0	182.6
Trinidad	---	279.4	351.4	450.0	121.7
Two Rivers	4.8	4.2	4.1	4.0	2.8
Pueblo	581.4	598.0	701.6	604.9	675.0
Platoro	2.9	3.6	2.6	2.5	9.8
Sumner	87.0	141.0	202.1	203.0	142.2

b. Fort Worth District. The following is a listing of lake attendance for both Corps and Section 7 Projects for Fiscal Years 1979 through 1983.

TOTAL PERSONS VISITING PROJECTS

Project	1979	1980	1981	1982	1983
Bardwell	681,260	727,143	985,812	1,000,308	977,823
Belton	3,976,219	2,490,074	4,083,197	2,449,310	2,446,444
Benbrook	1,940,960	2,010,460	2,078,136	2,007,943	2,020,447
Canyon	1,586,944	1,354,714	1,790,585	1,947,624	1,993,582
Georgetown	---	---	519,048	821,270	838,583
Granger	---	---	195,848	284,043	319,600
Grapevine	4,905,652	5,419,571	5,721,424	4,231,149	4,482,409
Hords Creek	334,602	358,553	526,119	829,561	833,248
Lake O' The Pine	3,854,740	3,973,739	3,981,742	4,979,192	5,243,834
Lavon	2,452,543	2,500,569	2,887,615	2,861,682	2,897,765
Lewisville	6,458,768	4,953,097	8,997,119	6,701,115	6,683,116
Navarro Mills	1,004,324	1,127,316	1,172,009	1,203,233	1,202,752
Proctor	1,023,212	1,005,287	1,040,331	787,569	834,256
Sam Rayburn	2,129,867	2,638,415	2,473,397	3,210,221	1,687,763
O. C. Fisher	992,552	932,805	912,716	1,690,258	3,304,133
Somerville	2,387,527	2,529,526	3,170,970	3,391,749	3,159,744
Stillhouse Hollow	1,005,671	872,593	1,176,788	981,487	909,148
Town Bluff	619,499	585,068	666,254	605,069	614,215
Waco	2,832,604	3,386,210	4,079,208	4,198,419	4,225,481
Whitney	2,297,833	2,031,536	3,093,766	2,579,171	2,236,552
Wright Patman	3,094,800	4,521,235	4,497,648	4,652,589	4,829,095
Twin Buttes	Not available				
Marshall Ford	Not available				

c. Galveston District. N/A

d. Little Rock District. Lake attendance for all Little Rock District lakes by calendar year is as follows:

ATTENDANCE

	1979	1980	1981	1982	1983
All Projects	35,187,800	37,568,800	39,848,600	43,105,000	43,100,000 (EST)

e. Tulsa District. The following is a listing of lake attendance figures for Calendar Years 1979 through 1982. Lake attendance data are not available for FY83; however, records through August 1983 indicate that it will be 5 to 10 percent less than the 1982 attendance.

ATTENDANCE IN THOUSANDS

Lake	1979	1980	1981	1982
Great Salt Pl.	991.6	719.7	582.7	647.6
Fort Supply	731.6	720.0	517.1	832.2
Canton	2,841.8	3,416.5	2,446.1	3,379.8
Hulah	580.4	531.0	422.0	469.7
Tenkiller Ferry	4,594.1	3,675.8	3,442.1	3,088.2
Wister	1,219.0	941.4	969.4	3,050.6
Keystone	4,155.7	4,112.7	4,601.1	786.7
Oologah	2,144.2	1,991.6	2,629.1	2,432.1
Fort Gibson	4,451.0	3,038.6	4,403.7	4,484.3
Fall River	371.8	277.1	156.7	214.0
Toronto	357.2	312.9	226.4	220.7
Elk City	292.7	294.9	247.8	299.0
Optima	37.2	58.0	121.5	170.7
Pat Mayse	1,218.9	1,009.4	460.5	519.2
Eufaula	6,455.0	4,240.3	4,114.5	4,560.8
Heyburn	708.6	420.0	274.3	394.2
Hugo	1,122.9	901.8	917.1	349.1
Lake Texoma	11,455.1	12,078.2	12,400.1	893.2
Waurika	251.8	404.1	517.5	10,679.6
Millwood	2,149.0	2,042.3	*	761.4
John Redmond	277.1	380.2	540.0	496.1
Council Grove	648.7	449.3	422.4	454.6
Broken Bow	897.8	878.3	970.6	1,033.4
Gillham	159.7	158.9	*	304.4
Marion	420.2	415.2	329.7	865.7
Pine Creek	937.7	821.5	944.1	1,129.8
Robert S. Kerr	1,404.4	1,133.3	1,577.6	224.6
W D Mayo L & D	301.7	229.0	264.0	420.3
Chouteau L & D	516.6	396.6	368.0	537.2
New Graham L & D	500.4	606.5	504.6	832.1
Webbers Falls	993.9	749.2	936.0	480.4
Birch	225.0	347.7	423.2	1,483.1
DeQueen	252.6	199.9	*	
Dierks	186.5	189.6	*	
Kaw	1,657.7	1,469.7	1,672.7	
District Total	55,509.6	49,611.2	48,453.2	46,494.8

8. Water Supply Storage.

a. Albuquerque District. Cochiti, Galisteo, Jemez Canyon and Two Rivers projects do not have storage allocated for water supply. For the last two years Abiquiu has stored water for the City of Albuquerque within the space allocated for sediment. The following table is a listing of those reservoirs with space allocated for water supply.

Storage in Thousands of Acre-Feet

Project	Storage Allocated	Amount Contracted	Number of Contracts	Water Supplied FY 82	Water Supplied FY 83
Conchas	259			70.0	78.4
John Martin	345			71.4	145.2
Santa Rosa	200			71.9	84.7
Trinidad	20			17.5	22.2

b. Fort Worth District. Water supply information per project is tabluated as follows:

Project Name	Storage Contracted (Ac-Ft)	Storage Allocated (Ac-Ft)	Number of Contracts (Users)	Water Supplied in FY 83 (Ac-Ft)
Aquilla Lake	33,600	52,480	1	0
B. A. Steinhagen Lake	1/	1/	1	1/
Bardwell Lake	21,400	42,800	1	2,814
Belton Lake	372,700	372,700	2	33,966
Benbrook Lake	23,708	23,708 2/	2	4,378
Canyon Lake	366,400	366,400	1	132,486
Georgetown Lake	101	29,200	1	27
Granger Lake	0	37,900	1	0
Grapevine Lake	161,250	161,250	3	32,021
Hords Creek Lake	5,780	5,780	1	282
Lake O' The Pines	250,000	250,000	1	14,069
Lavon Lake	220,000	220,000 3/	1	106,161
Lewisville Lake	436,000	436,000	2	149,754
Navarro Mills Lake	53,200	53,200	1	6,569
O.C. Fisher Lake	80,400	80,400	1	0
Proctor Lake	31,400	31,400	1	15,144
Sam Rayburn Reservoir	43,000	43,000	2	0
Somerville Lake	143,900	143,900	1	3,139
Stillhouse Hollow Lake	204,900	204,900	1	3,682
Waco Lake	104,100	104,100	2	26,746
Whitney Lake	50,000	50,000	1	0
Wright Patman Lake	91,263	91,263	1	55,905

1/ LNVA is permitted to withdraw from B.A. Steinhagen Lake not to exceed 2,000 CFS. This lake acts as a reregulation dam to Sam Rayburn Reservoir.

2/ Remaining 48,792 ac-ft of navigation storage is in the process of being negotiated with water user.

3/ NTMWD has given assurances for an additional 160,000 ac-ft of storage in Lavon Lake.

c. Galveston District. N/A.

d. Little Rock District. The following is a summary of water supply contracts and usage in FY 82 and 83 by project.

WATER SUPPLY USAGE SUMMARY

Project	Amount of Storage Allocated (AC-Ft)	Amount Contracted (AC-Ft)	Number of Contracts	Amount of Water Supplied (AC-FT) FY82	FY83
Beaver Lake	117,000	40,000	2	24,926	25,369
Greers Ferry Lake	3,215	3,215	3	1,523	1,636
Norfork Lake	2,400	2,400	1	1,908	2,105
Nimrod Lake	33	33	1	71	86
Dierks Lake	10,600	200	1	234	223
Millwood Lake	150,000	29,998	1	42,443	46,441
Gillham Lake	20,000	600	1	246	567
DeQueen Lake	17,900	0*	0	0	0

* Contract to be finalized in FY84.

e. Tulsa District. Storage allocated to water supply totals 3,762,600 acre-feet in the Tulsa District. The Corps has 2,145,580 acre-feet in 31 projects while the Section 7 projects totaled 1,617,020 acre-feet in 10 projects. The following is a project listing showing yield, amount contracted, number of contracts, and usage.

SECTION 7 PROJECTS

Project (5)	Storage Allocated to Water Supply AF	Amount Withdrawn AF FY82	FY83
ARKANSAS RIVER BASIN			
Cheney	146980	23281	21937
Hudson	0	0	0
Meredith	499700	70192	75369
Thunderbird	105900	10923	9747

RED RIVER BASIN

Altus	122900	56138	62134
Arbuckle	62570	8024	6939
Fort Cobb	78350	5441	6146
Foss	243670	2358	2567
Lake Kemp	268000	29508	60937
Mountain Park	88950	4395	3944

Corps of Engineers Projects

(October 1983)

PROJECT	STORAGE ALLOCATED TO WATER SUPPLY AF	ESTIMATED YIELD MGD	AMOUNT CONTRACTED AF	NUMBER OF CONTRACTS EXISTING	PENDING	AMOUNT SUPPLIED AF FY82	FY83
ARKANSAS RIVER BASIN							
Arcadia (1)	23090	11	12090	1	0	0	0
Big Hill	25700	8.5	25700	1	0	0	150
Birch	7630	3	0	0	1	0	0
Candy (1)	41460	7.7	41460	1	1	0	0
Canton	107000 (2)	12	90000	2	0	0	0
Copan	7500	3	5000	1	1	0	22
Council Grove	24400	6	24400	1	0	0	0
El Dorado	142800	22.2	142800	1	0	0	0
Elk City	24300	10	24300	1	0	0	0
Eufaula	56000	50	5071	26	1	2515	2578
Fort Gibson	0	0	0	0	0	16226	14095
Fort Supply	400	0.2	400	1	0	203	254
Heyburn	2000 (3)	1.7	2000	3	0	1365	1634
Hulah	19800	12.4	19800	3	0	9938	8076
John Redmond	34900	24.5	34900	1	0	0	0
Kaw	171200	167	90802	4	0	0	0
Keystone	20000	20	18450	4	1	5653	5736
Marion	38300	3	38300	1	0	303	400
Oologah	342600	154	55760	9	6	44262	43361
Optima	76200	4.5	0	0	0	0	0
Skiatook (1)	64600	14	2060	1	2	0	0
Tenkiller	25400	16	18672	35	2	6329	6969
Toronto	400	0.1	400	2	0	70	73
Wister	9600	6	6400	2	1	2841	2812

RED RIVER BASIN

Broken Bow	152500	175	0	0	1	0	0
Hugo	47600	58	44890	3	0	6002	5403
Pat Mayse	109600	55	109600	1	0	9900	11217
Pine Creek	49400	84	28800	1	0	33648	33667
Sardis	297200	140	297200	1	0	1290	0
Texoma (4)	72600	44.7	42898	8	1	1190	0
Waurika	151400	36.2	41800	1	1	4430	4620

(1) Under construction
(2) Based on 1979 sedimentation survey. Data shown are for present operations providing 90000 acre-feet of storage.
(3) Estimated storage to be available in year 2000.
(4) Joint water supply and power provided between elevations 617.0 - 590.0.
(5) Estimated yield and contract information not available.

EXPERIMENT FORM (March 1976)
SOUTHWESTERN DIVISION

TABLE 2
PROPOSED COOPERATIVE STREAM GAGING PROGRAM
FOR
FISCAL YEAR 1983
PART A

ALBUQUERQUE DISTRICT
JULY 1982 DATE OF PREPARATION
REPORT CONTROL SYMBOL DAEN-CWE-14

STATIONS IN COOPERATIVE PROGRAM WITH USGS

GROSS DOLLARS SUPPORTING PROGRAM

CLASS OF FUNDS	NUMBER OF STATIONS	USGS AER FUNDS	GEN INVES	CONST GEN	O & M	TOTAL	TOTAL CE/USGS PROGRAM	FOR CORPS OPERATION	OTHER USGS FUNDS	TOTAL FOR CORPS	TOTAL STATION SUPPORT
B	1	0	1,610	0	0	1,610	1,610	0	0	0	1,610
C	5*	13,100	8,170	0	0	8,170	21,270	0	0	8,170	$21,270
E	35	0	0	0	166,660	166,660	166,660	0	0	166,660	166,660
F	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	40	$13,100	$9,780	0	$166,660	$176,440	$189,540	0	0	$176,440	$189,540

CLASS OF FUNDS:

B - Surveys

C - General Coverage

E - Operation and Maintenance

F - New Work or Construction

* 1 Additional station is partially funded

EXPERIMENT FORM (MARCH 1976)

SOUTHWESTERN DIVISION

TABLE 2

PROPOSED COOPERATIVE STREAMFLOW DATA PROGRAM SURVEY

FOR

FISCAL YEAR 1983

PART A

GALVESTON DISTRICT

12 July 1982 DATE OF PREPARATION

REPORT CONTROL SYMBOL DAEN-CWE-14

STATIONS IN COOPERATIVE PROGRAM WITH USGS

		GROSS DOLLARS SUPPORTING PROGRAM									
			PROPOSED TRANSFER TO USGS FROM CORPS								
CLASS OF FUNDS	NUMBER OF STATIONS	USGS AER FUNDS	GEN INVES	CONST GEN	O & M	TOTAL	TOTAL CE/USGS PROGRAM	FOR CORPS OPERATION	OTHER USGS FUNDS	TOTAL FOR CORPS	TOTAL STATION SUPPORT
B	1*		4870			4870	4870	0	0	4870	4870
C	2*	5730				0	5730	0	0	0	5730
D	0					0	0	0	0	0	0
E	30				135,440	135,440	135,440	13,975	9290	149,415	158,705
F	3			8480		8480	8480	0	0	8480	8480
SUBTOTAL	35	5730	4870	8480	135,440	148,790	154,520	13,975	9290	162,765	177,785

*Coverage for one gage is both B & C.

PART B

TOTAL STREAM FLOW DATA PROGRAM FOR CORPS OF ENGINEERS

CLASS OF FUNDS	TOTAL CE/USAS PROGRAM	COST FOR CORPS OPERATION	NUMBER OF STATIONS	COST FOR CORPS STATIONS	CORPS GRAND TOTAL COST
B	4870	0	0	0	4870
C	5730	0	0	0	5730
E	135,440	13,975	0	0	149,415
F	8480	0	0	0	8480
TOTAL	154,520	13,975	0	0	168,495

CLASS OF FUNDS:

B - Surveys
C - General Coverage
E - Operation and Maintenance
F - New Work or Construction

EXPERIMENT FORM (MARCH 1976)

SOUTHWESTERN DIVISION

TABLE 2

PROPOSED COOPERATIVE STREAMFLOW DATA PROGRAM SURVEY

FOR

FISCAL YEAR 1983

PART A

July 1982 DATE OF PREPARATION

FORT WORTH DISTRICT

REPORT CONTROL SYMBOL DAEN-CWE-14

STATIONS IN COOPERATIVE PROGRAM WITH USGS

GROSS DOLLARS SUPPORTING PROGRAM

PROPOSED TRANSFER TO USGS FROM CORPS

CLASS OF FUNDS	NUMBER OF STATIONS	USGS AER FUNDS	GEN INVES	CONST GEN	O & M	TOTAL	TOTAL CE/USGS PROGRAM	FOR CORPS OPERATION	OTHER USGS FUNDS	TOTAL FOR CORPS	TOTAL STATION SUPPORT
B	4	0	21,640	0	0	21,640	21,640	750	0	22,930	22,390
C	11	8,370	0	0	0	0	8,370	1,070	0	1,070	9,440
D	0	0	0	0	0	0	0	0	0	0	0
E	79	0	0	0	372,470	372,470	372,470	16,125	40,300	388,595	428,895
F	20	0	0	92,550	0	92,550	92,550	4,375	4,940	96,925	101,865
SUBTOTAL	114*	8,370	21,640	92,550	372,470	486,660	495,030	22,320	45,240	508,980	562,590

*Note: Total is 1 less than shown
Station 08110200
has dual funding.

PART B

TOTAL STREAM FLOW DATA PROGRAM FOR CORPS OF ENGINEERS

CLASS OF FUNDS	TOTAL CE/USGS PROGRAM	COST FOR CORPS OPERATION	NUMBER OF STATIONS	COST FOR CORPS STATIONS	CORPS GRAND TOTAL COST
B	21,640	750	NONE	NONE	22,390
C	8,370	1,070			9,490
D	0	0			0
E	372,470	16,125			388,595
F	92,550	4,375			96,925
TOTAL	495,030	22,320			518,350

CLASS OF FUNDS:

B - Surveys
C - General Coverage
D - Advance Engineering and Design
E - Operation and Maintenance
F - New Work or Construction

EXPERIMENT FORM (MARCH 1976)

SOUTHWESTERN DIVISION

TABLE 2
PROPOSED COOPERATIVE STREAMFLOW DATA PROGRAM SURVEY
FOR
FISCAL YEAR 1983
PART A

LITTLE ROCK DISTRICT
15 July 1982 DATE OF PREPARATION
REPORT CONTROL SYMBOL DAEN-CWE-14

STATIONS IN COOPERATIVE PROGRAM WITH USGS

		GROSS DOLLARS SUPPORTING PROGRAM									
			PROPOSED TRANSFER TO USGS FROM CORPS								
CLASS OF FUNDS	NUMBER OF STATIONS	USGS AER FUNDS	GEN INVES	CONST GEN	O & M	TOTAL	TOTAL CE/USGS PROGRAM	FOR CORPS OPERATION	OTHER USGS FUNDS	TOTAL FOR CORPS	TOTAL STATION SUPPORT
B	6	0	19,560	0	0	19,560	19,560	0	0	19,560	19,560
C	9*	11,020	13,060	0	0	16,650	27,670	3,700	0	20,350	31,370
E	62	0	0	0	260,920	257,330	257,330	106,300	47,460	363,630	411,090
SUBTOTAL	75	11,020	36,620	0	260,920	293,540	304,560	106,300	47,460	403,540	462,020

*2 stations are funded under C&E

PART B
TOTAL STREAM FLOW DATA PROGRAM FOR CORPS OF ENGINEERS

CLASS OF FUNDS	TOTAL CE/USGS PROGRAM	COST FOR CORPS OPERATION	NUMBER OF STATIONS	COST FOR CORPS STATIONS	CORPS GRAND TOTAL COST
B	19,560	0	0	0	19,560
C	27,670	3,700	0	0	31,370
E	257,330	106,300	35	73,200	436,830
TOTAL	304,560	110,000	35	73,200	487,760

CLASS OF FUNDS:

B - Surveys
C - General Coverage
D - Advance Engineering and Design
E - Operation and Maintenance
F - New Work or Construction

EXPERIMENT FORM (MARCH 1976)

SOUTHWESTERN DIVISION

TABLE 2
PROPOSED COOPERATIVE STREAMFLOW DATA PROGRAM SURVEY
FOR
FISCAL YEAR 1983
PART A

TULSA DISTRICT
30 June 1982 DATE OF PREPARATION
REPORT CONTROL SYMBOL DAEN-CWE-14

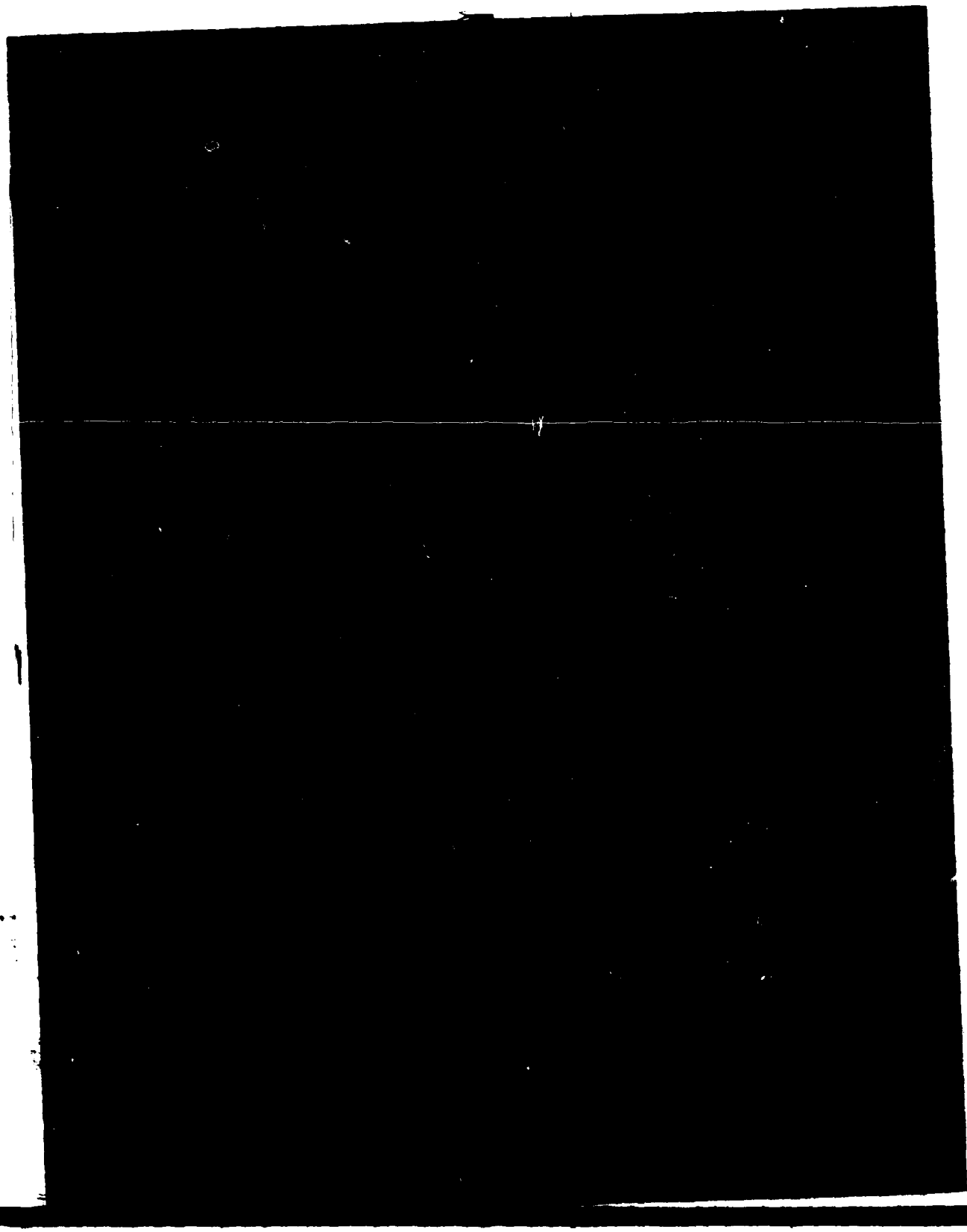
STATIONS IN COOPERATIVE PROGRAM WITH USGS

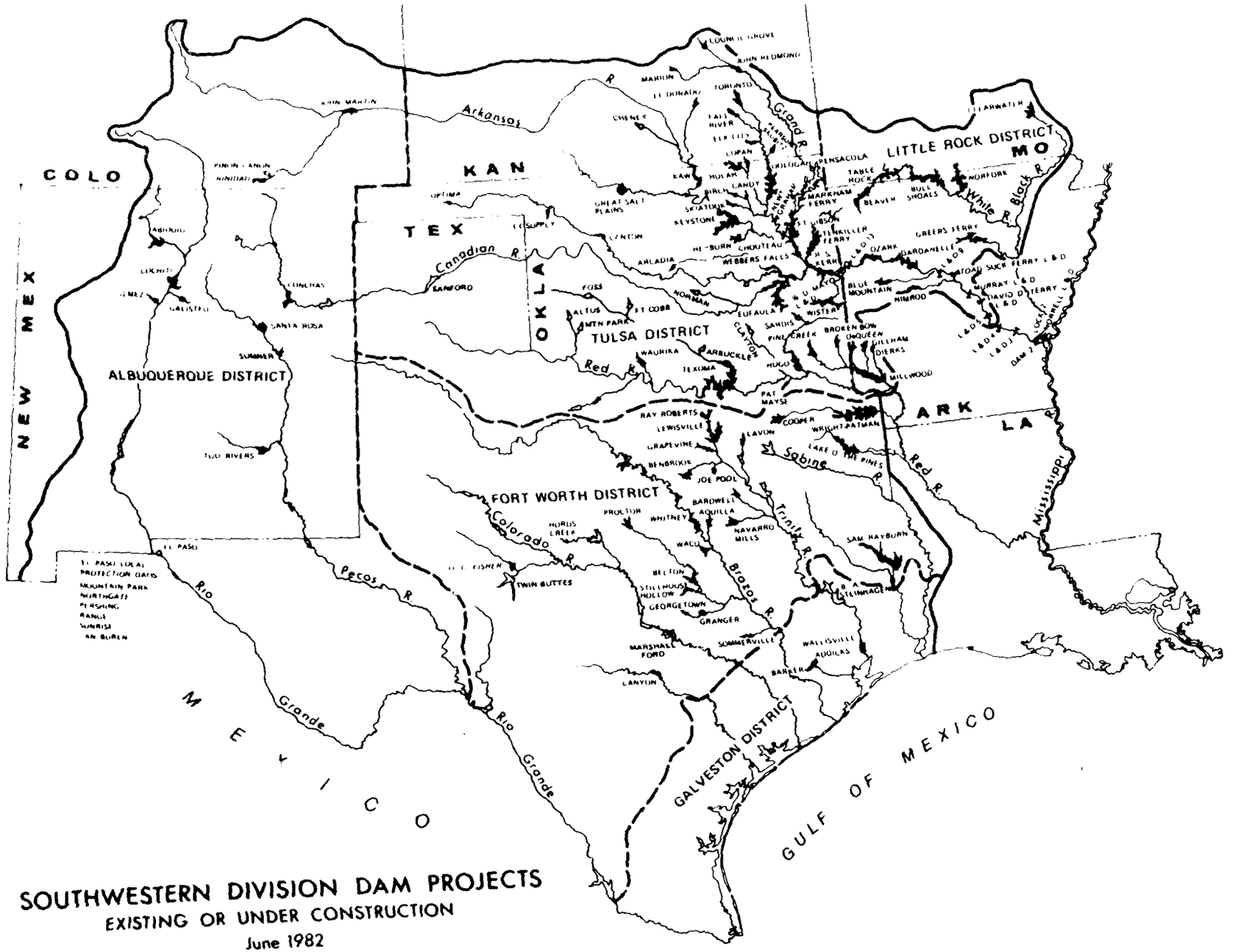
CLASS OF FUNDS	NUMBER OF STATIONS	GROSS DOLLARS SUPPORTING PROGRAM									
		USGS AER FUNDS	GEN INVES	PROPOSED TRANSFER TO USGS FROM CORPS			TOTAL CE/USGS PROGRAM	FOR CORPS OPERATION	OTHER USGS FUNDS	TOTAL FOR CORPS	TOTAL STATION SUPPORT
				CONST GEN	O & M	TOTAL					
C	20							5,610	37,100	5,610	42,710
D	0										
E	214	3,700			500,760	500,760	504,460	161,190	129,650	661,950	795,300
F	4			13,280		13,280	13,280	7,600		20,880	20,880
SUBTOTAL	238	3,700		13,280	500,760	514,040	517,740	174,400	166,750	688,440	858,890

PART B
TOTAL STREAM FLOW DATA PROGRAM FOR CORPS OF ENGINEERS

CLASS OF FUNDS	TOTAL CE/USGS PROGRAM	COST FOR CORPS OPERATION	NUMBER OF STATIONS	COST FOR CORPS STATIONS	CORPS GRAND TOTAL COST
C		5,610			5,610
D					
E	504,460	161,190	33	39,580	705,230
F	13,280	7,600	1	2,800	23,680
TOTAL	517,740	174,400	34	42,380	734,520

Class of Funds:
B - Surveys
C - General Coverage
D - Advance Engineering and Design
F - New Work or Construction
E - Operation and Maintenance





SOUTHWESTERN DIVISION DAM PROJECTS

EXISTING OR UNDER CONSTRUCTION

June 1982

(WITH SECTION 7 FLOOD CONTROL PROJECTS ADDED)

LAKE SUMMARY TABLE INDEX

LAKE NAME	STREAM	DIST	STATE	YR COMP	POOL ELEVATION CONS	POOL ELEVATION FC	CAPACITY** 1000 AF CONS	CAPACITY** 1000 AF FC	PAGE NO
Canton	N Canadian R	TD	OK	48	1615.2	1638.0	116	268	20
Eufaula	Canadian R	TD	OK	64	585.0	597.0	2329	1470	21
R S kerr LD 15	Arkansas	TD	OK	70	460.0	-	494	0	21
W D Mayo LD 14	Arkansas	TD	OK	70	413.0	-	16	0	22
Wister	Poteau R	TD	OK	49	471.6	502.5	27	400	22
LD 13	Arkansas	LRD	AR/OK	69	392.0	-	54	0	23
Ozark-J T LD 12	Arkansas	LRD	AR	69	372.0	-	148	0	23
Dardanelle LD 10	Arkansas	LRD	AR	64	338.0	-	486	0	24
Blue Mountain	Petit Jean	LRD	AR	47	384.0	419.0	25	233	24
LD 9	Arkansas	LRD	AR	69	287.0	-	65	0	25
Toad Suck Ferry LD 8	Arkansas	LRD	AR	69	265.0	-	35	0	25
Nimrod	Fourche La Fave	LRD	AR	42	342.0	373.0	29	307	26
Murray LD 7	Arkansas	LRD	AR	69	249.0	-	87	0	26
D D Terry LD 6	Arkansas	LRD	AR	68	231.0	-	50	0	27
LD 5	Arkansas	LRD	AR	68	213.0	-	65	0	27
LD 4	Arkansas	LRD	AR	68	196.0	-	70	0	28
LD 3	Arkansas	LRD	AR	68	182.0	-	46	0	28
LD 2	Arkansas	LRD	AR	67	162.0	-	110	0	29
LD 1	Arkansas	LRD	AR	67	142.0	-	2	0	29
			RED RIVER BASIN						
Altus	N F Red	TD*	OK	46	1559.0	1562.0	141	21	30
Tom Steed (Mtn. Park)	W Otter Creek	TD*	OK	75	1411.0	1414.0	96	20	30
Lake Kemp	Wichita R	TD*	TX	77	1144.0	1156.0	299	225	31
Waurika	Beaver Creek	TD	OK	78	951.4	962.5	203	140	31
Foss	Washita	TD*	OK	61	1562.0	1668.6	256	181	32
Fort Cobb	Cobb Creek	TD*	OK	59	1342.0	1354.8	78	64	32
Arbuckle	Rock Creek	TD*	OK	67	872.0	885.3	72	36	33
Lake Texoma	Red	TD	TX/OK	45	617.3	640.0	2836	2660	33
Pat Mayse	Sanders Creek	TD	TX	68	451.0	460.5	124	65	34
Sardis	Jack Fork Creek	TD	OK	84	599.0	607.0	302	128	34
Hugo	Kiamichi R	TD	OK	74	404.5	437.5	157	809	35
Pine Creek	Little R	TD	OK	69	443.5	480.0	78	388	35
Broken Bow	Mountain Fork	TD	OK	69	599.5	627.5	919	450	36
DeQueen	Rolling Fork	LRD	AR	77	437.0	473.5	35	101	37
Gillham	Cossatot	LRD	AR	76	502.0	569.0	33	189	37
Dierks	Saline R	LRD	AR	76	526.0	557.5	30	67	38
Millwood	Little R	LRD	AR	66	259.2	287.0	207	1653	38
Wright Patman	Sulphur River	FWD	TX	56	220.0	259.5	143	2509	39
Lake O the Pines	Cypress Creek	FWD	TX	60	228.5	249.5	251	580	39

* Section 7 Flood Control Projects

** Includes dead storage, conservation, water supply, power, irrigation, etc.

LAKE SUMMARY TABLE INDEX

LAKE NAME	STREAM	DIST	STATE	YR COMP	POOL ELEVATION CONS	POOL ELEVATION FC	CAPACITY** 1000 AF CONS	CAPACITY** 1000 AF FC	PAGE NO
			WHITE RIVER BASIN						
Beaver	White	LRD	AR	66	1120.0	1130.0	1652	300	1
Table Rock	White	LRD	AR/MO	58	915.0	931.0	2702	760	1
Bull Shoals	White	LRD	AR/MO	52	654.0	695.0	3048	2360	2
Norfork	North Fork	LRD	AR/MO	45	552.0	580.0	1251	732	2
Clearwater	Black	LRD	MO	48	494.0	567.0	22	391	3
Greers Ferry	Little Red	LRD	AR	62	461.0	487.0	1119	934	3
			ARKANSAS RIVER BASIN						
Pueblo	Arkansas	AD*	CO	74	4880.6	4898.7	264	93	4
Trinidad	Purgatorie R	AD	CO	78	6226.4	6260.0	64	58	4
John Martin	Arkansas	AD	CO	51	3851.0	3870.0	351	270	5
Cheney	N F Ninnescah	TD*	KS	64	1421.6	1429.0	167	81	5
Eldorado	Walnut	TD	KS	80	1339.0	1347.5	157	79	6
Kaw	Arkansas	TD	OK/KS	76	1010.0	1044.5	429	919	6
Great Salt Plains	Salt Fork Ark	TD	OK	41	1125.0	1138.5	31	240	7
Keystone	Arkansas	TD	OK	64	723.0	754.0	618	1219	7
Heyburn	Polecat Cr	TD	OK	50	761.5	784.0	7	48	8
Toronto	Verdigris R	TD	KS	60	901.5	931.0	22	178	8
Fall River	Fall	TD	KS	49	948.5	987.5	24	235	9
Elk City	Elk	TD	KS	66	792.0	825.0	34	256	9
Big Hill	Big Hill Cr	TD	KS	81	858.0	867.5	27	13	10
Oologah	Verdigris R	TD	OK	63	638.0	661.0	553	966	10
Hulah	Caney	TD	OK/KS	51	733.0	765.0	36	258	11
Copan	L Caney	TD	OK/KS	80	710.0	732.0	43	184	11
Birch	Birch Creek	TD	OK	79	750.5	774.0	19	39	12
Skiatook	Hominy Creek	TD	OK	82	714.0	729.0	305	182	12
Newt Graham LD 18	Verdigris	TD	OK	70	532.0	-	24	0	13
Chouteau LD 17	Verdigris	TD	OK	70	511.0	-	23	0	13
Council Grove	Neosho R	TD	KS	65	1270.0	1289.0	38	76	14
Marion	Cottonwood R	TD	KS	68	1350.5	1358.5	86	60	14
John Redmon	Neosho R	TD	KS	64	1039.0	1068.0	82	563	15
Grand Lake (Pensacola)	Neosho (Grand)	TD*	OK	40	745.0	755.0	1672	525	15
Lake Hudson	Neosho (Grand)	TD*	OK	64	619.0	636.0	200	244	16
Fort Gibson	Neosho (Grand)	TD	OK	52	554.0	582.0	365	919	16
Webbers Falls LD 16	Arkansas	TD	OK	70	490.0		165	0	17
Tenkiller Ferry	Illinois R	TD	OK	52	632.0	667.0	654	577	17
Conchas	Canadian R	AD	NM	39	4201.0	4218.0	330	198	18
Meredith (Sanford)	Canadian R	TD*	TX	65	2941.3	2965.0	945	463	18
Thunderbird (Norman)	Little R	TD*	TX	65	1039.0	1049.4	120	77	19
Optima	N Canadian R	TD	OK	78	2763.5	2779.0	129	101	19
Fort Supply	Wolf Cr	TD	OK	42	2004.0	2028.0	14	87	20

* Section 7 Flood Control Projects

** Includes dead storage, conservation, water supply, power, irrigation, etc.

LAKE SUMMARY TABLE INDEX

LAKE NAME	STREAM	DIST	STATE	YR COMP	POOL ELEVATION CONS	POOL ELEVATION FC	CAPACITY** 1000 AF CONS	CAPACITY** 1000 AF FC	PAGE NO
			NECHES RIVER BASIN						
Sam Rayburn	Angelina R	FWD	TX	65	164.4	173.0	2898	1009	40
B A Steinhagen	Neches R	FWD	TX	51	81.0	83.0	70	24	40
			TRINITY RIVER BASIN						
Benbrook	Clear Fork	FWD	TX	52	694.0	724.0	88	170	41
Lewisville	Elm Fork	FWD	TX	54	515.0	532.0	465	525	41
Grapevine	Denton Cr	FWD	TX	52	535.0	560.0	189	248	42
Navarro Mills	East Fork	FWD	TX	77	492.0	503.5	457	277	42
Bardwell	Richland Cr	FWD	TX	68	424.5	443.0	63	149	43
	Waxahachie Cr	FWD	TX	65	421.0	439.0	55	85	43
			SAN JACINTO RIVER BASIN						
Barker	Buffalo Bayou	GD	TX	45	-	107.0	0	207	44
Addicks	Buffalo Bayou	GD	TX	48	-	114.0	0	205	44
			BRAZOS RIVER BASIN						
Whitney	Brazos	FWD	TX	51	533.0	571.0	627	1372	45
Aquilla	Aquilla	FWD	TX	83	537.5	556.0	34	87	45
Waco	Bosque	FWD	TX	65	455.0	500.0	153	574	46
Proctor	Leon R	FWD	TX	63	1162.0	1197.0	59	315	46
Belton	Leon R	FWD	TX	54	594.0	631.0	458	640	47
Stillhouse H	Lampasas R	FWD	TX	68	622.0	666.0	236	395	47
Georgetown	N F San Gabriel	FWD	TX	79	791.0	834.0	37	93	47
Granger	San Gabriel	FWD	TX	79	504.0	524.0	66	179	48
Somervillle	Yegua Cr	FWD	TX	67	238.0	258.0	160	347	48
			COLORADO RIVER BASIN						
Twin Buttes	S&M Concho R	FWD*	TX	63	1940.2	1969.1	186	454	49
O C Fisher	N Concho R	FWD	TX	52	1908.0	1938.5	119	277	49
Hords Cr	Hords Cr	FWD	TX	48	1900.0	1920.0	9	17	50
Marshall Ford	Colorado R	FWD*	TX	40	681.0	714.0	1172	780	50
			GUADALUPE RIVER BASIN						
Canyon	Guadalupe R	FWD	TX	64	909.0	943.0	386	355	53
			RIO GRANDE BASIN						
Platoro	Conejos R	AD*	CO	51	10027.5	10034.0	54	6	54
Abiquiu	Rio Chama	AD	NM	63	-	6283.5	0	568	54
Cochiti	Rio Grande	AD	NM	75	5321.45	5460.5	47	539	55
Galisteo	Galisteo Cr	AD	NM	70	-	5608.0	0	90	55
Jemez Canyon	Jemez R	AD	NM	53	5160.0	5232.0	2	104	56
Santa Rosa	Pecos R	AD	NM	80	4776.5	4797.0	267	182	56
Sumner	Pecos R	AD*	NM	37	4261.0	4282.0	47	86	57
Two Rivers	Rio Hondo	AD	NM	63	-	4032.0	0	168	57

*Section 7 Flood Control Projects

**Includes dead storage, conservation, water supply, power, irrigation, etc.

ALPHABETICAL INDEX

SUMMARY OF LAKE CONDITIONS FOR WATER YEAR 1983

WHITE RIVER BASIN

BEAVER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1968 thru 1983	44.8	105.4	109.7	77.7	98.2	180.7	162.3	127.7	90.2	24.6	14.2	28.8	1,064.3
WY 1983	5.1	59.6	328.1	40.6	85.5	76.0	222.8	156.8	39.8	6.9	6.6	-4.5	1,023.3
Releases (1,000 AC. FT.)													
Avg 1968 thru 1983	31.0	54.0	65.6	83.8	89.3	85.2	101.0	94.5	88.1	97.2	93.4	58.1	941.2
WY 1983	57.5	13.6	8.0	6.9	201.4	158.3	47.8	40.9	78.0	202.5	120.7	76.9	1,012.5
Basin Rainfall (inches)													
Avg 1968 thru 1983	4.2	3.8	3.2	2.1	2.0	3.9	4.0	4.7	4.4	2.6	2.8	3.7	41.4
WY 1983	4.1	6.7	8.4	1.1	1.9	3.2	6.5	6.5	4.9	1.0	2.2	1.5	48.0
Deviation	-0.1	+2.9	+5.2	-1.0	-0.1	-0.7	+2.5	+1.8	+0.5	-1.6	-0.6	-2.2	+6.6
Pool Elevation													
End of Month	1,110.89	1,112.42	1,123.80	1,124.71	1,120.49	1,117.25	1,123.08	1,126.57	1,124.82	1,117.45	1,112.55	1,108.89	
Maximum	1,113.27	1,112.42	1,123.80	1,124.71	1,126.44	1,120.66	1,123.08	1,126.65	1,126.71	1,124.82	1,117.45	1,112.55	
Minimum	1,110.83	1,110.35	1,112.42	1,123.80	1,120.49	1,117.20	1,117.25	1,123.08	1,124.82	1,117.45	1,112.55	1,108.89	
Pool Content EOM (1,000 AC. FT.)	1,408.6	1,447.6	1,761.7	1,788.8	1,665.9	1,575.7	1,740.6	1,844.9	1,792.1	1,581.1	1,451.0	1,358.8	

TABLE ROCK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1961 thru 1983	96.6	207.8	234.7	205.8	204.9	353.4	393.1	371.1	229.8	147.6	148.5	102.1	2,695.4
WY 1983	73.6	137.6	902.9	126.5	343.3	267.5	634.3	421.0	184.6	277.1	799.0	76.4	4,243.8
Releases (1,000 AC. FT.)													
Avg 1961 thru 1983	113.5	79.4	233.1	218.0	217.0	262.6	293.2	326.3	210.3	213.7	166.4	118.5	2,452.0
WY 1983	89.4	125.3	845.0	201.4	374.4	343.8	331.4	476.0	176.2	309.5	297.1	114.1	3,683.6
Intervening Basin Rainfall (inches)													
Avg 1961 thru 1983	4.4	3.9	3.3	1.9	1.6	3.9	4.3	4.5	4.8	2.9	3.4	3.8	42.7
WY 1983	3.1	5.4	9.1	0.8	1.1	2.6	7.3	5.8	3.6	2.6	1.9	1.6	44.9
Deviation	-1.3	+1.5	+5.8	-1.1	-0.5	-1.3	+3.0	+1.3	-1.2	-0.3	-1.5	-2.1	+2.2
Pool Elevation													
End of Month	915.90	915.95	917.08	915.16	914.23	912.10	918.78	917.12	916.86	915.63	911.39	910.10	
Maximum	916.55	916.08	926.69	917.08	915.74	914.60	918.78	920.52	917.13	917.30	915.63	911.39	
Minimum	915.90	914.48	915.83	914.93	914.13	912.09	912.10	916.73	916.62	915.47	911.36	910.00	
Pool Content EOM (1,000 AC. FT.)	2,740.7	2,742.8	2,792.5	2,708.9	2,668.9	2,579.2	2,868.1	2,794.3	2,782.3	2,729.1	2,550.0	2,497.1	

WHITE RIVER BASIN

BULL SHOALS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1953 thru 1983	138.1	249.0	318.8	272.6	315.9	473.3	512.8	578.8	344.2	383.1	200.1	158.1	3,944.8
WY 1983	105.1	262.1	1,652.7	278.2	466.7	429.7	855.3	728.0	266.9	403.9	312.9	118.0	5,879.5
Releases (1,000 AC. FT.)													
Avg 1953 thru 1983	211.5	193.0	240.6	318.0	299.1	311.2	360.2	396.2	318.0	392.9	336.2	242.7	3,619.6
WY 1983	135.0	280.3	415.0	1,015.0	995.6	461.3	520.0	537.9	517.3	478.6	392.7	194.3	5,943.0
Basin Rainfall (inches)													
Avg 1953 thru 1983	3.4	4.0	3.0	1.9	1.7	3.4	4.3	4.3	3.5	3.4	3.4	3.9	40.2
WY 1983	2.7	5.3	9.7	0.8	0.8	2.3	7.0	5.1	3.7	2.6	2.0	1.7	43.7
Deviation	-0 7	+1.3	+6.7	-1.1	-0.9	-1.1	+2.7	+0.8	+0.2	-0.8	-1.4	-2.2	+3.5
Pool Elevation													
End of Month	655.45	654.72	678.10	664.49	653.16	652.04	658.89	662.25	656.53	654.31	651.91	649.70	
Maximum	656.56	655.45	678.10	680.03	664.49	653.23	658.89	663.49	662.26	657.31	654.33	651.91	
Minimum	655.45	652.09	654.72	664.49	652.84	652.04	651.99	658.89	656.53	654.14	651.78	649.70	
Pool Content EOM (1,000 AC. FT.)	3,114.0	3,080.8	4,305.0	3,553.0	3,010.2	2,959.8	3,275.7	3,440.5	3,163.9	3,062.1	2,954.0	2,857.1	

NORFORK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1946 thru 1983	47.2	84.7	111.2	119.0	124.1	177.5	194.1	192.3	104.5	76.4	48.0	45.6	1,324.6
WY 1983	29.6	80.6	625.8	91.3	81.5	88.2	357.0	215.3	84.9	63.6	36.2	29.8	1,783.8
Releases (1,000 AC. FT.)													
Avg 1946 thru 1983	66.9	66.6	88.6	121.5	115.8	56.9	129.1	65.9	107.2	119.5	112.0	84.9	1,134.9
WY 1983	59.3	23.2	118.0	350.8	188.4	96.4	220.2	162.8	131.6	169.5	115.8	74.1	1,710.10
Basin Rainfall (inches)													
Avg 1946 thru 1983	2.8	3.5	3.1	2.5	2.6	3.6	4.2	4.9	4.1	3.6	3.0	3.4	41.3
WY 1983	3.1	5.7	10.8	1.6	0.9	2.2	6.6	3.9	4.3	2.1	1.6	2.5	45.3
Deviation	+0.3	+2.2	+7.7	-0.9	-1.7	-1.4	+2.4	-1.0	+0.2	-1.5	-1.4	-0.9	+4.0
Pool Elevation													
End of Month	542.52	545.13	566.87	556.11	551.10	550.35	556.11	557.89	555.39	550.08	545.69	543.06	
Maximum	544.37	545.13	566.87	567.30	556.11	551.81	556.11	558.52	558.01	555.39	550.09	545.70	
Minimum	542.40	542.32	545.13	556.11	551.10	550.31	550.35	556.11	555.39	550.08	545.69	543.03	
Pool Content EOM (1,000 AC. FT.)	1,054.8	1,106.5	1,609.1	1,343.8	1,231.4	1,215.3	1,343.8	1,385.4	1,327.2	1,209.5	1,117.9	1,065.3	

WHITE RIVER BASIN

CLEARWATER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1949 thru 1983	20.3	33.3	57.5	55.1	55.2	88.3	94.9	77.7	34.8	26.9	18.4	20.7	583.1
WY 1983	36.1	38.8	383.0	60.5	36.5	26.3	247.1	158.6	32 9	16.1	12.1	12.7	1,060.7
Releases (1,000 AC. FT.)													
Avg 1949 thru 1983	22.5	32.1	49.9	53.3	57.2	75.9	88.0	76.0	51.6	32.9	26.5	25.4	571.3
WY 1983	95.5	18.9	116.8	224.6	15.7	21.9	96.2	160.3	120.0	69.1	14.0	14.1	967.1
Basin Rainfall (inches)													
Avg 1949 thru 1983	2.7	3.6	3.3	2.6	2.6	4.0	4.4	4.7	3 6	3.7	3.4	3.3	41.9
WY 1983	3.1	4.2	12.2	0.6	0.4	2.5	10.4	5.0	2.6	1.8	0.9	2.2	45.9
Deviation	+0.4	+0.6	+8.9	-2.0	-2.2	-1.5	+6.0	+0.3	-1.0	-1.9	-2.5	-1.1	+4.0
Pool Elevation													
End of Month	494.20	504.20	555.74	531.24	493.89	496.33	537.25	536.61	517.91	498.34	496.90	495.28	
Maximum	517.54	504.20	556.15	555.74	531.24	496.33	537.25	546.24	536.61	517.91	498.34	496.92	
Minimum	494.20	493.69	504.04	531.24	493.89	493.81	496.33	536.61	517.91	498.34	496.85	493.87	
Pool Content EOM (1,000 AC. FT.)	22.2	42.0	30.8	142.9	21.7	25.9	176.1	172.4	83.6	29.5	26.8	24.0	

GREERS FERRY LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1965 thru 1983	32.5	98.0	192.4	115.5	129.8	229.3	212.0	156.4	61.6	12.0	7.7	29.8	1,157.0
WY 1983	7.5	173.9	971.9	35.8	74.5	105.5	317.7	359.9	47.7	13.3	-5.0	-8.0	2,094.7
Releases (1,000 AC. FT.)													
Avg 1965 thru 1983	39.5	45.0	80.3	147.9	130.2	120.4	127.5	134.0	6.5	111.5	96.4	55.8	1,185.0
WY 1983	27.1	11.2	100.8	469.2	383.4	150.5	170.3	239.8	170.3	207.6	127.6	43.4	2,101.2
Basin Rainfall (inches)													
Avg 1964 thru 1983	3.7	4.3	4.7	2.8	2.8	4.9	4.8	5.3	4.0	3.4	3.1	4.9	48.7
WY 1983	4.8	8.6	17.4	0.9	1.6	3.4	7.1	8.1	4.4	1.8	2.1	1.1	61.3
Deviation	+0.9	+4.3	+12.7	-1.9	-1.2	-1.5	+2.3	+2.8	+0.4	-1.6	-1.0	-3.8	+12.6
Pool Elevation													
End of Month	451.86	457.18	482.31	470.38	460.86	459.16	463.55	466.83	462.67	455.95	450.93	448.78	
Maximum	452.77	457.18	482.31	482.31	470.45	461.62	463.55	468.37	466.83	462.73	455.95	450.93	
Minimum	451.75	451.82	457.18	470.38	460.86	459.12	459.16	463.55	462.36	455.95	450.93	448.78	
Pool Content EOM (1,000 AC. FT.)	1,635.1	1,792.4	2,659.1	2,220.3	1,906.1	1,853.0	1,991.6	2,099.2	1,963.4	1,755.5	1,609.0	1,548.8	

PUEBLO DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1894 thru 1983	21.8	22.4	21.1	19.8	16.4	15.6	23.5	66.7	129.1	87.6	56.8	26.1	492.0
FY 1983	25.0	20.7	22.5	19.7	18.0	16.6	17.7	26.5	120.7	111.5	60.0	17.5	476.1
Releases (1000 Ac-Ft)													
Avg 1966 thru 1983	8.8	7.2	4.5	4.1	4.2	11.8	19.3	28.6	64.6	46.8	28.3	12.0	240.1
FY 1983	18.6	6.2	2.5	2.2	2.0	6.1	15.3	21.9	91.2	97.1	60.4	20.1	343.6
Rainfall (Inches)													
Avg 1938 thru 1983	.73	.43	.45	.33	.40	.76	1.29	1.76	1.36	1.99	1.85	.77	12.09
FY 1983	.35	.22	.04	.51	.17	2.06	.46	2.11	2.31	2.13	1.55	.28	12.19
Pool Elevation (EOM)	4819.96	4831.59	4845.94	4856.70	4865.26	4869.71	4868.73	4867.85	4878.03	4879.65	4874.61	4870.61	
Maximum	4819.96	4831.59	4845.94	4856.70	4865.26	4869.71	4870.17	4868.72	4878.03	4879.65	4879.74	4874.35	4879.74
Minimum	4816.05	4820.18	4832.07	4846.24	4857.00	4865.60	4868.73	4867.27	4867.95	4872.89	4874.61	4870.57	4816.05
Pool Content (EOM) (1000 Ac-Ft)	68.7	95.1	134.4	168.8	199.9	217.5	213.6	210.0	253.2	260.6	238.1	221.2	

TRINIDAD LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1977 thru 1983	2.2	1.5	1.5	1.0	1.0	1.4	3.3	11.3	15.8	10.8	10.3	5.4	64.5
FY 1983	4.8	2.5	1.7	1.7	1.8	3.3	10.0	15.3	36.1	19.7	10.9	3.5	111.2
Releases (1000 Ac-Ft)													
Avg 1978 thru 1983	1.6	.5	.4	.3	.4	.3	2.5	7.8	14.8	12.2	9.8	8.7	59.3
FY 1983	2.7	.30	.10	.07	.08	0	2.7	16.4	36.6	19.9	14.2	15.3	108.5
Rainfall (Inches)													
Avg 1978 thru 1983	.72	.80	.56	.59	.52	1.28	.81	2.98	2.64	3.13	3.56	1.5	19.68
FY 1983	1.05	.86	.91	.53	1.32	1.90	1.49	2.42	5.06	.93	3.50	.15	20.12
Pool Elevation (EOM)	6208.39	6210.26	6211.56	6212.93	6214.44	6217.00	6222.49	6221.20	6220.17	6219.26	6216.03	6204.58	
Maximum	6208.39	6210.26	6211.56	6212.93	6214.44	6217.00	6222.64	6222.52	6221.36	6220.63	6219.32	6215.71	6222.64
Minimum	6206.41	6208.46	6210.26	6211.61	6212.96	6214.46	6217.20	6221.20	6220.17	6219.26	6216.03	6204.58	6204.58
Pool Content (EOM) (1000 Ac-Ft)	45.1	47.1	48.5	50.0	51.8	54.8	61.6	60.0	58.7	57.5	53.6	41.2	

JOHN MARTIN RESERVOIR

Inflows (1000 Ac-Ft)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Avg 1943 thru 1983	7.0	6.3	6.7	7.8	7.0	7.2	7.4	14.9	47.9	37.1	28.2	9.2	186.7
FY 1983	25.3	11.0	12.8	14.8	11.3	18.1	28.7	30.6	113.3	85.2	19.6	8.1	378.9
Releases (1000 Ac-Ft)													
Avg 1921 thru 1983	13.1	5.9	4.4	4.1	3.6	3.4	23.0	32.6	47.0	40.7	43.2	20.6	241.3
FY 1983	22.9	.30	.10	.0	0	.02	.40	42.8	24.0	73.1	77.4	40.9	282.0
Rainfall (Inches)													
Avg 1943 thru 1983	.69	.41	.28	.23	.21	.60	.99	2.13	1.50	1.88	1.77	.79	11.45
FY 1983	.55	.07	2.64	.23	.70	2.27	1.43	2.75	1.08	.99	.78	.26	12.74
Pool Elevation (EOM)	3795.85	3800.49	3804.88	3809.26	3812.15	3816.20	3821.78	3818.87	3832.87	3833.62	3824.36	3817.35	
Maximum	3796.14	3800.49	3804.88	3809.26	3812.15	3816.20	3821.78	3822.88	3832.87	3838.33	3833.30	3824.08	3838.33
Minimum	3795.23	3796.08	3800.66	3805.00	3809.39	3812.26	3816.30	3818.47	3819.31	3833.62	3824.36	3817.35	3795.23
Pool Content (EOM) (1000 Ac-Ft)	12.8	23.1	35.4	49.7	60.3	76.8	103.4	88.9	174.7	180.4	117.7	81.9	

ARKANSAS RIVER BASIN

CHERRY RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1938 THRU 1981	11.65	7.53	6.44	6.63	8.27	13.31	14.69	18.68	17.71	9.29	5.22	9.33	128.8
FY 1983	2.04	3.48	5.75	5.41	11.95	17.53	31.46	27.85	18.38	9.62	2.44	1.29	137.2
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	4.72	18.57	3.15	3.13	3.45	8.16	12.16	15.40	13.73	3.03	1.59	1.74	88.9
FY 1983	0.00	0.00	0.00	0.00	2.57	9.76	28.09	20.28	10.55	8.05	0.00	0.00	79.3
RAINFALL(INCHES)													
AVG 1938 THRU 1977	2.12	1.30	0.90	0.66	0.92	1.54	2.50	3.60	4.10	3.14	2.97	3.09	26.84
FY 1983	0.43	0.36	0.58	0.07	1.38	1.81	1.57	3.78	3.29	1.12	1.02	1.33	16.73
DEVIATION	-1.69	-0.95	-0.32	-0.59	0.46	0.27	-0.93	0.18	-0.81	-2.02	-1.95	-1.76	-10.11
POOL ELEVATION													
END OF MONTH	1420.34	1420.41	1420.77	1421.11	1421.82	1422.10	1421.89	1422.03	1422.19	1421.26	1420.30	1419.60	
MAXIMUM	1420.66	1420.43	1420.77	1421.11	1421.94	1422.10	1423.08	1422.82	1422.26	1422.46	1421.26	1420.30	
MINIMUM	1420.35	1420.29	1420.40	1420.77	1421.11	1421.57	1421.60	1421.60	1421.62	1421.26	1420.30	1419.60	
POOL CONTENT--END (1000AC.FT)	[illegible]	155.97	159.27	162.42	169.16	171.86	169.83	171.17	172.75	163.84	154.97	148.70	

ELDORADO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1921 THRU 1977	5.00	4.40	2.80	2.70	2.20	6.20	10.20	11.80	14.40	7.40	3.40	5.50	76.5
FY 1983	0.13	0.13	1.03	0.84	1.61	8.51	36.09	3.68	11.57	1.06	0.42	0.66	65.8
RELEASES(1000AC.FT.)	NOTE: OPERATED IN ACCORDANCE WITH INITAL FILLING PLAN.												
FY 1983	0.61	1.18	1.23	0.73	0.51	0.31	6.10	1.27	10.57	0.80	0.75	0.49	24.6
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.45	1.66	1.12	0.85	0.99	1.87	2.97	4.40	3.71	3.71	3.19	3.92	30.83
FY 1983	1.14	0.27	1.21	0.09	0.61	1.53	3.76	1.68	4.47	0.42	0.73	1.71	17.62
DEVIATION	-1.31	-1.39	0.09	-0.75	-0.37	-0.34	0.79	-2.72	0.76	-3.29	-2.46	-2.21	-13.21
POOL ELEVATION													
END OF MONTH	1324.76	1324.38	1324.22	1324.12	1324.29	[illegible]92	1331.30	1331.28	1331.05	1330.47	1329.64	1328.91	
MAXIMUM	1325.30	1324.76	1324.39	1324.22	1324.31	1[illegible]92	1331.59	1331.41	1332.21	1331.11	1330.47	1329.64	
MINIMUM	1324.76	1324.36	1324.17	1324.07	1324.12	1324.29	1325.92	1331.23	1331.01	1330.47	1329.64	1328.91	
POOL CONTENT-END (1000AC.FT)	68.88	67.18	66.46	66.01	66.77	74.28	103.31	103.19	101.80	98.41	93.65	89.58	

KAW LAK	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1922 THRU 1981	158.53	125.65	84.51	85.12	96.99	171.76	249.25	301.29	342.30	239.71	131.96	141.41	2129.5
FY 1983	25.89	27.41	38.48	43.74	92.83	273.02	712.75	306.06	346.08	272.49	39.17	30.54	2209.5
RELEASES(1000AC.FT.)													
AVG 1977 THRU 1983	44.22	168.31	58.41	61.71	95.63	188.27	231.90	200.34	352.89	234.27	55.55	96.96	1838.4
FY 1983	9.03	15.32	18.61	103.34	92.24	133.34	792.29	253.58	310.61	369.72	31.51	25.85	2155.4
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.40	1.64	1.12	0.84	1.02	1.90	2.92	4.31	4.50	3.60	3.20	3.70	31.05
FY 1983	0.99	0.50	0.97	0.19	1.38	2.76	2.81	3.10	4.71	1.35	1.31	2.49	22.56
DEVIATION	-1.41	-1.14	-0.15	-0.65	0.36	0.86	-0.11	-1.21	0.21	-2.25	-1.89	-1.21	-8.49
POOL ELEVATION													
END OF MONTH	1009.70	1010.27	1011.35	1007.70	1007.63	1015.40	1010.80	1013.30	1014.60	1008.64	1008.46	1008.39	
MAXIMUM	1009.71	1010.27	1011.35	1011.40	1009.87	1015.40	1025.60	1015.40	1014.67	1015.15	1008.76	1008.68	
MINIMUM	1008.93	1009.50	1010.27	1007.53	1007.63	1007.57	1010.30	1010.06	1011.94	1008.17	1008.41	1008.30	
POOL CONTENT-END (1000AC.FT)	422.54	433.27	457.13	290.75	289.65	527.92	442.44	437.61	513.29	405.93	403.00	401.86	

ARKANSAS RIVER BASIN

GREAT SALT PLAINS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.-FT.)													
AVG 1951 THRU 1981	21.21	15.25	9.13	9.21	13.11	21.07	31.69	54.65	45.26	22.56	21.24	19.10	283.5
CY 1983	3.07	5.65	7.22	7.03	14.23	43.82	76.13	46.40	109.17	18.35	2.26	12.69	346.0
RELEASES(1000AC.-FT.)													
AVG 1976 THRU 1983	3.01	22.07	6.08	5.93	9.47	22.72	25.75	59.70	59.83	24.71	4.51	9.70	253.1
CY 1983	0.76	0.49	6.30	5.83	11.55	33.75	77.71	38.48	92.16	32.09	0.76	1.66	301.5
RAINFALL(INCHES)													
AVG 1930 THRU 1977	1.67	1.13	0.85	0.66	0.91	1.45	2.37	3.61	3.59	2.53	2.95	2.46	24.45
CY 1983	0.14	0.61	0.57	0.25	0.99	1.89	0.71	1.24	4.96	0.00	0.59	3.40	15.36
DEVIATION	-1.73	-0.58	-0.28	-0.40	0.08	0.44	-1.66	-2.37	1.37	-2.53	-2.37	0.94	-9.09
POOL ELEVATION													
END OF MONTH	1124.77	1125.19	1125.23	1125.2[illegible]	1125.42	1126.23	1125.56	1125.93	1127.03	1124.92	1124.36	1125.05	
MAXIMUM	1125.05	1125.20	1125.29	1125.27	1125.44	1126.23	1126.97	1126.0[illegible]	1127.96	1127.12	1124.92	1125.16	
MINIMUM	1124.75	1124.70	1125.18	1125.15	1125.22	1125.39	1125.56	1125.22	1125.70	1124.92	1124.36	1124.13	
POOL CONTENT- CY (1000AC.-FT)	29.56	33.18	33.55	33.46	35.32	43.11	36.62	40.05	51.53	30.77	26.21	31.88	

ARKANSAS RIVER BASIN

KEYSTONE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.-FT.)													
AVG 1963 THRU 1981	194.63	288.16	175.45	167.90	194.73	336.81	536.34	752.88	738.79	466.47	283.50	328.51	4664.2
CY 1983	35.11	47.50	74.78	135.47	211.74	442.11	1291.32	1010.18	707.11	520.07	60.10	31.12	4606.6
RELEASES(1000AC.-FT.)													
AVG 1976 THRU 1983	77.58	229.42	110.95	39.89	125.88	262.42	445.01	674.35	724.59	455.65	130.65	190.74	3553.1
CY 1983	40.96	27.85	36.29	125.74	132.84	342.05	1358.86	921.60	675.18	639.23	77.78	50.51	4481.9
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.42	1.63	1.13	0.95	1.11	1.81	2.90	4.37	4.18	3.20	3.03	3.50	30.33
CY 1983	0.63	1.70	1.10	0.33	1.59	2.96	2.31	5.01	4.21	0.19	1.76	3.25	25.09
DEVIATION	-1.74	0.02	-0.08	-0.62	0.49	1.15	-0.59	0.64	0.03	-3.01	-1.27	-0.25	-5.24
POOL ELEVATION													
END OF MONTH	720.03	720.73	722.31	722.54	723.75	727.52	724.29	727.12	727.88	722.92	721.63	722.34	
MAXIMUM	720.84	720.78	722.33	722.54	725.48	727.73	729.03	732.12	729.07	728.29	723.01	722.47	
MINIMUM	719.91	719.85	720.78	720.23	722.54	721.13	724.04	724.07	725.73	722.92	721.63	720.48	
STORAGE													
END OF MONTH	441.15	537.41	561.62	546.94	575.66	674.03	538.93	662.90	684.05	555.75	526.15	542.31	

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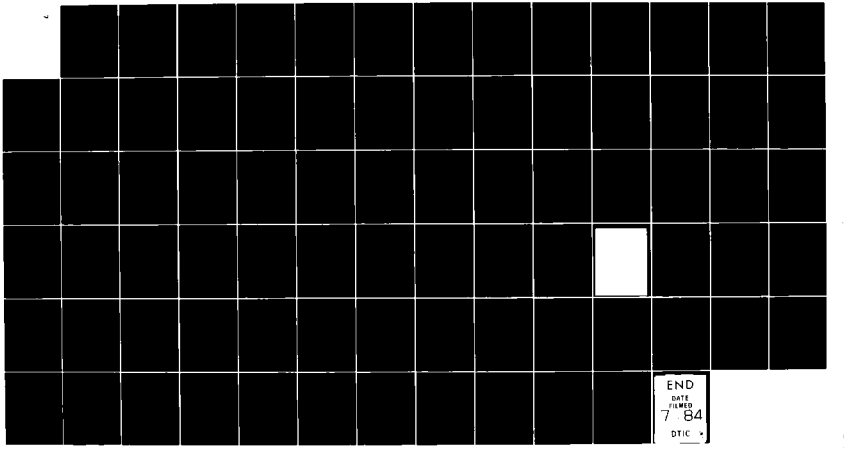

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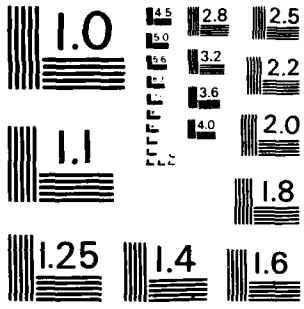

ARKANSAS RIVER BASIN

MEREDITH LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1929 THRU 1981	2.44	2.65	1.50	1.30	1.92	3.24	6.15	7.82	7.59	2.51	1.53	3.77	42.4
FY 1983	0.06	0.69	2.39	0.90	8.09	4.97	7.37	15.66	2.82	0.00	0.01	0.05	43.0
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	0.49	1.15	0.13	0.36	2.21	1.43	2.63	12.02	5.25	0.44	0.06	0.49	26.6
FY 1983	0.00	0.00	0.87	0.42	8.37	4.20	7.31	15.02	3.43	0.05	0.00	0.00	39.7
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.94	2.25	1.51	1.40	1.54	2.32	3.53	4.80	4.28	3.22	3.05	3.71	34.63
FY 1983	3.36	4.62	3.50	0.85	2.57	2.79	3.27	6.96	3.35	0.39	0.72	2.09	32.47
DEVIATION	-1.58	2.37	1.99	-0.55	1.03	0.47	-0.26	2.08	-0.93	-2.83	-2.33	-1.62	-2.16
POOL ELEVATION													
END OF MONTH	759.93	760.56	761.95	762.25	761.87	762.39	762.14	762.72	761.70	760.90	760.10	759.47	
MAXIMUM	760.29	760.56	762.63	762.25	765.73	763.82	763.78	767.22	763.46	761.70	760.90	760.10	
MINIMUM	759.83	759.78	760.56	761.52	761.72	761.66	761.85	761.71	761.57	760.90	760.10	759.47	
POOL CONTENT-END (1000AC.FT)	5.37	5.85	7.05	7.35	6.97	7.50	7.26	7.84	6.82	6.10	5.50	5.06	

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ARKANSAS RIVER BASIN

TORONTO LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1922 THRU 1981	19.64	18.97	11.46	12.33	13.35	32.04	46.42	40.55	52.97	34.79	9.13	23.24	314.9
FY 1983	6.68	4.84	28.69	10.05	42.32	39.74	146.16	27.16	37.04	2.97	0.20	0.19	346.0
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	5.24	19.28	8.24	3.61	21.02	25.14	43.52	31.31	54.03	22.97	6.18	7.36	247.9
FY 1983	5.16	2.72	19.46	17.47	44.45	23.54	153.51	34.62	34.84	3.11	0.34	0.30	339.5
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.75	2.00	1.32	1.04	1.06	2.35	3.35	4.73	5.10	3.96	3.38	4.45	35.49
FY 1983	2.10	0.93	2.28	0.28	0.84	1.58	5.17	2.80	4.80	0.93	1.31	2.18	25.20
DEVIATION	-0.65	-1.07	0.96	-0.76	-0.22	-0.77	1.82	-1.93	-0.30	-3.03	-2.07	-2.27	-10.29
POOL ELEVATION													
END OF MONTH	901.62	902.19	905.16	902.79	901.66	906.72	904.75	902.25	902.42	901.82	901.08	900.60	
MAXIMUM	903.41	902.34	906.30	905.15	906.29	906.94	921.81	904.75	905.90	902.42	901.82	901.08	
MINIMUM	901.17	901.45	901.53	901.44	901.55	901.54	902.10	901.60	901.44	901.43	900.99	900.60	
POOL CONTENT-END (1000AC.FT)	21.03	22.69	31.72	24.54	21.46	37.27	30.40	23.06	23.53	21.89	19.91	18.71	

FALL RIVER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1922 THRU 1981	15.23	14.09	8.25	9.31	10.03	23.69	36.26	33.38	37.93	18.32	6.26	15.10	227.9
FY 1983	3.66	2.15	14.27	5.68	31.81	33.77	112.96	17.59	31.80	16.32	0.44	0.31	270.8
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	2.25	9.59	4.65	2.30	12.61	18.33	33.54	31.01	44.79	30.53	4.48	3.69	197.8
FY 1983	2.17	0.99	11.52	7.21	34.07	20.54	124.98	18.90	31.01	14.62	0.35	0.36	266.7
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.64	1.72	1.24	0.93	1.04	2.10	3.19	4.45	4.86	3.80	3.16	4.18	33.31
FY 1983	2.38	0.83	2.43	0.15	1.09	2.33	4.61	2.51	5.73	0.98	1.22	1.94	26.19
DEVIATION	-0.26	-0.89	1.19	-0.78	0.04	0.23	1.51	-1.94	0.87	-2.82	-1.94	-2.24	-7.03
POOL ELEVATION													
END OF MONTH	948.47	948.83	950.35	949.72	948.72	953.17	949.63	948.56	948.51	948.50	947.89	947.28	
MAXIMUM	949.19	948.84	950.84	950.35	951.33	953.44	968.25	949.63	953.40	952.70	948.51	947.89	
MINIMUM	948.07	948.27	948.58	948.51	948.69	948.52	949.17	948.56	948.46	948.42	947.89	947.28	
POOL CONTENT-EOM (1000AC.FT)	21.85	22.70	26.62	24.94	22.44	35.13	24.71	22.06	21.95	21.92	20.51	19.17	

ELK CITY LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1922 THRU 1981	18.46	17.90	8.53	10.19	9.90	25.74	41.73	40.68	42.54	21.54	5.05	14.88	257.0
FY 1983	0.73	0.36	16.72	5.93	46.09	49.82	118.36	47.65	9.09	3.60	0.22	0.19	298.8
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1982	1.14	11.47	5.97	6.71	11.45	18.71	31.90	31.78	41.62	69.39	5.00	3.57	238.7
FY 1983	0.27	0.18	11.82	13.01	46.66	22.84	123.00	46.25	6.14	4.17	0.68	0.71	277.7
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.87	2.13	1.36	1.23	1.17	2.28	3.55	4.75	5.15	3.71	3.17	4.53	35.90
FY 1983	1.61	1.58	2.80	0.15	1.19	3.05	5.17	3.81	4.62	0.53	0.98	1.54	26.94
DEVIATION	-1.26	-0.55	1.44	-1.08	-0.07	0.77	1.62	-0.94	-0.53	-3.18	-2.19	-2.99	-8.96
POOL ELEVATION													
END OF MONTH	793.46	793.36	794.82	792.85	792.13	798.40	796.56	796.40	796.64	795.98	795.23	794.60	
MAXIMUM	793.59	793.46	795.60	794.82	797.89	798.52	807.67	798.39	796.76	796.64	795.98	795.23	
MINIMUM	793.36	793.21	793.04	792.01	792.13	792.00	794.19	794.09	796.00	795.97	795.18	794.60	
POOL CONTENT-EOM (1000AC.FT)	44.34	33.93	39.73	32.05	29.43	56.15	47.31	46.58	47.67	44.67	41.45	38.83	

BIG HILL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1929 THRU 1979	1.69	1.19	0.75	1.05	0.67	1.69	2.30	3.13	3.60	1.73	0.27	1.33	19.4
FY 1983	0.03	0.13	0.56	0.63	1.66	3.49	10.79	4.20	0.43	0.04	0.16	0.09	22.2
RELEASES(1000AC.FT.)													
AVG 1983	NOTE: INITIAL FILLING OF CONSERVATION POOL -- MAY 1983								0.11	0.00	0.15	0.00	0.26
FY 1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.34	0.11	0.00	0.15	0.00	2.60
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.14	2.43	1.52	1.46	1.34	2.54	3.82	5.18	5.67	3.81	3.36	4.90	39.17
FY 1983	1.24	2.67	3.05	0.84	1.94	4.26	8.03	5.67	4.67	1.18	3.07	2.25	38.87
DEVIATION	-1.90	0.24	1.53	-0.62	0.60	1.72	4.21	0.49	-1.00	-2.63	-0.29	-2.65	-0.30
POOL ELEVATION													
END OF MONTH	839.96	839.98	840.61	841.35	843.28	847.00	856.85	857.94	857.85	857.37	856.81	856.49	
MAXIMUM	840.21	839.99	840.61	841.35	843.28	847.00	856.85	859.64	857.94	857.85	857.37	856.81	
MINIMUM	839.89	839.88	839.98	840.61	841.35	843.28	847.00	856.85	857.75	857.37	856.73	856.48	
POOL CONTENT-EOM (1000AC.FT)	9.60	9.61	10.03	10.65	12.20	15.50	26.12	27.46	27.34	26.75	26.07	25.69	

ARKANSAS RIVER BASIN

OOLOGAH LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1981	152.90	138.22	90.40	91.90	94.20	179.83	276.30	289.73	290.68	163.74	51.80	107.14	1906.8
FY 1983	11.81	24.89	139.04	96.00	316.46	236.13	969.62	416.39	134.68	50.38	2.49	4.16	2402.1
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	22.80	104.64	37.38	27.29	96.65	146.00	230.38	182.00	228.46	305.30	41.47	39.02	1491.4
FY 1983	1.84	1.78	66.02	116.01	305.17	195.93	840.22	470.56	188.39	56.57	1.36	1.49	2245.4
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.21	2.30	1.54	1.45	1.32	2.51	3.74	5.07	5.28	3.69	3.31	4.79	38.21
FY 1983	1.14	2.74	2.69	0.27	1.54	3.35	5.76	4.68	3.49	0.89	1.24	2.42	30.21
DEVIATION	-2.07	0.44	1.15	-1.18	0.22	0.84	2.02	-0.39	-1.79	-2.80	-2.07	-2.37	-8.00
POOL ELEVATION													
END OF MONTH	636.85	637.36	639.57	638.70	638.85	639.91	643.49	641.13	638.68	637.75	636.94	636.31	
MAXIMUM	637.01	637.39	639.57	640.26	641.57	640.51	644.69	643.59	641.21	638.70	637.75	639.95	
MINIMUM	636.67	636.63	637.31	637.93	638.70	638.09	639.25	639.67	638.11	637.70	636.83	636.30	
POOL CONTENT-EOM (1000AC.FT)	520.41	535.02	600.97	574.47	578.99	611.33	728.92	650.21	573.87	546.23	522.97	505.09	

HULAH LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1919 THRU 1941	26.93	22.70	9.62	9.63	9.35	24.64	40.30	45.44	38.01	29.02	12.81	25.62	294.1
FY 1983	0.85	1.36	6.69	5.52	27.74	43.23	94.40	109.15	11.64	1.99	0.23	0.65	303.5
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	3.74	16.37	8.36	1.43	10.69	17.50	30.28	46.77	48.01	28.11	7.35	2.90	221.5
FY 1983	0.80	0.77	0.82	0.80	27.99	26.35	34.33	114.85	15.99	3.06	0.74	0.71	287.2
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.97	2.10	1.40	1.23	1.20	2.19	3.50	4.77	4.72	3.45	3.35	4.21	35.09
FY 1983	0.82	1.18	2.69	0.19	1.85	2.31	3.22	4.04	3.05	0.04	1.15	2.48	23.02
DEVIATION	-2.15	-0.92	1.29	-1.04	0.65	0.12	-0.29	-0.73	-1.67	-3.41	-2.20	-1.73	-12.07
POOL ELEVATION													
END OF MONTH	731.35	731.03	732.43	733.43	733.23	737.20	736.96	735.24	733.59	732.71	731.81	731.06	
MAXIMUM	731.99	731.37	732.43	733.43	735.69	737.34	740.00	744.34	735.24	733.60	732.72	731.82	
MINIMUM	731.31	730.99	730.89	732.43	732.73	733.02	733.05	733.29	733.20	732.71	731.81	731.06	
POOL CONTENT-EOM (1000AC.FT)	25.55	24.52	29.14	32.70	31.96	47.97	46.89	39.66	33.29	30.11	27.04	24.62	

COPAN	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1936 THRU 1982	6.52	6.35	14.96	29.69	43.76	27.49	21.27	5.24	13.54	16.57	9.25	5.36	200.0
FY 1983	0.18	0.14	8.97	7.82	37.59	42.58	85.44	89.71	17.45	0.87	0.21	0.70	291.7
RELEASES(1000AC.FT.)													
AVG 1983	INITIAL FILLING OF INTERIM CONSERV. POOL--APRIL 1983							87.62	29.73	1.07	0.37	0.38	119.2
FY 1983	0.00	0.00	0.00	0.00	0.00	0.00	41.72	87.62	29.73	1.07	0.37	0.33	160.9
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.05	2.22	1.40	1.32	1.25	2.35	3.52	4.83	5.01	3.46	3.16	4.00	35.64
FY 1983	0.96	1.82	2.71	0.19	1.61	3.24	4.44	4.86	2.88	0.25	0.60	1.77	25.33
DEVIATION	-2.11	-0.40	1.31	-1.13	0.36	0.89	0.92	-0.03	-2.13	-3.21	-2.56	-2.23	-10.31
POOL ELEVATION													
END OF MONTH	676.00	676.70	696.70	694.60	696.78	698.60	711.45	711.86	709.08	708.42	707.73	707.34	
MAXIMUM	676.50	677.10	696.70	696.70	699.75	698.80	713.15	716.23	711.86	709.08	708.42	707.73	
MINIMUM	676.00	676.00	676.10	692.90	694.60	696.40	698.50	709.22	709.00	708.42	707.73	707.34	
POOL CONTENT--EOM (1000AC.FT)	0.05	0.05	5.10	3.14	5.13	7.61	50.78	52.92	39.06	36.13	33.16	31.56	

ARKANSAS RIVER BASIN

BIRCH LK.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1936 THRU 1972	2.37	0.97	0.80	0.62	0.64	1.90	3.02	5.34	3.04	1.88	0.84	1.96	23.4
FY 1983	0.02	1.01	4.31	1.35	4.63	1.97	7.46	7.84	2.78	0.17	0.00	0.00	31.5
RELEASES(1000AC.FT.)													
AVG 1979 THRU 1983	0.21	0.18	0.16	0.63	1.47	1.15	1.91	5.60	2.11	0.99	0.27	0.25	14.9
FY 1983	0.18	0.17	0.12	2.41	5.02	1.24	4.13	10.80	0.48	2.07	0.31	0.30	27.3
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.85	2.08	1.45	1.24	1.31	2.37	3.28	5.01	4.52	3.23	3.31	4.42	35.07
FY 1983	0.30	2.86	2.76	0.29	2.53	1.83	2.49	4.44	2.80	0.26	0.76	2.21	23.44
DEVIATION	-2.55	0.78	1.31	-1.04	1.22	-0.54	-0.79	-0.57	-1.72	-2.97	-2.55	-2.21	-11.63
POOL ELEVATION													
END OF MONTH	748.36	748.94	752.48	751.45	750.78	751.21	753.55	750.63	752.10	749.84	748.83	748.03	
MAXIMUM	748.82	749.24	752.48	752.53	754.05	751.47	753.95	755.05	752.26	752.10	749.84	748.83	
MINIMUM	748.30	748.21	748.94	750.53	750.42	750.46	750.26	750.58	750.28	749.84	748.83	748.03	
POOL CONTENT-END (100JAC.FT)	16.82	17.44	21.49	20.28	19.50	20.00	22.80	19.33	21.04	18.44	17.33	16.46	

ARKANSAS RIVER BASIN

SKIATOOK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1935 THRU 1978	13.47	8.09	3.91	3.61	4.29	12.59	15.35	28.43	16.19	10.64	4.09	12.37	133.0
FY 1983	0.62	1.27	14.11	2.72	43.17	16.10	44.51	76.30	9.21	1.78	0.44	0.44	210.7
RELEASES(1000AC.FT.)													
LAKE HAS NOT FILLED													
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.96	2.15	1.44	2.53	1.35	2.33	3.28	4.82	4.33	3.33	3.30	4.35	36.17
FY 1983	0.32	3.07	2.20	0.27	2.39	1.59	2.67	4.23	2.15	0.27	0.69	2.39	22.23
DEVIATION	-2.64	0.92	0.76	-2.26	1.03	-0.74	-0.61	-0.59	-2.18	-3.06	-2.61	-1.96	-13.94
POOL ELEVATION													
END OF MONTH	620.90	622.60	624.40	630.00	623.60	631.10	641.50	623.00	624.70	621.70	623.40	622.80	
MAXIMUM	620.90	624.40	643.30	630.00	654.70	639.10	645.50	656.00	639.00	624.70	623.40	623.40	
MINIMUM	620.80	620.90	620.30	621.00	623.00	621.40	622.90	623.00	621.30	621.50	621.50	622.80	
POOL CONTENT-END (100JAC.FT)	0.03	0.06	0.10	0.34	0.08	0.41	1.79	0.06	0.11	0.04	0.07	0.06	

ARKANSAS RIVER BASIN

MONT GRAHAM LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1957	306.03	159.47	104.65	137.73	123.85	203.04	501.27	562.13	549.77	233.60	99.67	137.64	3118.9
FY 1983	10.12	44.70	186.55	205.73	614.78	364.56	1254.96	1034.97	327.67	106.06	13.68	12.89	4186.7
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	42.28	183.75	84.34	72.64	179.12	262.54	420.35	476.39	415.18	384.73	77.39	63.28	2662.0
FY 1983	10.86	43.78	185.89	204.73	614.76	353.60	1264.17	1034.82	327.33	106.12	13.66	12.15	4182.0
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.21	2.26	1.58	1.46	1.47	2.49	3.62	4.87	4.72	3.37	3.25	4.49	36.79
FY 1983	0.75	3.74	2.96	0.33	2.55	2.45	4.46	5.22	3.20	0.52	0.84	2.39	29.47
DEVIATION	-2.46	1.48	1.38	-1.07	1.03	-0.04	0.84	0.35	-1.52	-2.85	-2.41	-2.10	-7.32
POOL ELEVATION													
END OF MONTH	532.23	532.32	532.44	532.49	532.24	532.34	532.05	532.00	532.00	532.30	532.11	532.66	
MAXIMUM	532.50	532.49	532.49	532.49	532.49	532.93	532.49	532.49	532.70	532.70	532.75	532.78	
MINIMUM	532.09	531.99	531.92	532.00	531.65	531.45	531.58	531.51	531.70	531.90	532.11	532.00	
POOL CONTENT-EOM													
(1000AC.FT)	23.84	23.98	24.17	24.24	23.86	24.01	23.57	23.49	23.49	23.95	23.66	24.51	

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ARKANSAS RIVER BASIN

CHOUTEAU LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1957	306.03	159.47	104.65	137.73	123.85	203.31	501.22	562.13	549.77	233.60	99.67	137.64	3119.1
FY 1983	8.53	42.50	183.07	162.45	638.68	380.83	1292.83	1085.75	343.93	91.06	9.86	11.84	4251.3
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	39.60	179.25	77.28	62.44	176.91	254.66	425.62	471.36	424.12	370.77	70.91	56.73	2609.7
FY 1983	8.56	42.30	182.18	161.83	638.97	379.85	1294.79	1039.14	342.13	90.14	8.32	11.34	4249.6
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.49	2.77	2.05	1.92	2.04	2.89	4.19	5.19	4.96	3.18	2.96	4.30	39.94
FY 1983	1.27	5.18	2.89	0.83	3.93	3.12	3.68	6.82	4.12	0.58	0.86	2.37	35.70
DEVIATION	-2.22	2.41	0.83	-1.09	1.95	0.23	-0.51	1.63	-0.84	-2.60	-2.10	-1.93	-4.24
POOL ELEVATION													
END OF MONTH	511.15	511.43	511.42	511.60	511.19	511.38	511.08	511.29	511.29	511.48	511.48	511.42	
MAXIMUM	511.55	511.59	511.63	511.60	511.69	511.78	511.60	511.64	511.51	511.51	511.51	511.52	
MINIMUM	511.15	511.03	511.07	511.16	510.94	511.05	511.07	511.07	511.03	511.09	511.23	511.25	
POOL CONTENT-EOM													
(1000AC.FT)	22.91	23.63	23.52	23.93	23.00	23.43	22.75	23.23	23.23	23.66	23.66	23.52	

COUNCIL GROVE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1922 THRU 1981	5.97	4.43	2.97	2.79	3.75	7.35	10.32	12.52	16.44	12.31	5.02	7.52	91.4
FY 1983	0.09	0.59	0.88	1.29	5.88	10.02	51.11	40.26	18.52	2.25	0.49	0.48	131.9
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1982	0.73	3.24	3.16	0.43	3.89	5.66	11.06	10.00	16.00	16.44	1.11	1.08	72.8
FY 1983	0.61	0.24	2.07	0.58	5.09	3.81	45.55	42.77	17.53	2.76	0.59	0.36	122.0
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.60	1.63	1.20	0.85	0.92	1.91	3.17	4.72	5.05	3.88	3.55	4.00	33.48
FY 1983	0.32	1.00	1.08	0.42	0.70	1.65	5.28	3.00	4.11	2.62	1.97	2.89	25.04
DEVIATION	-2.28	-0.63	-0.12	-0.43	-0.22	-0.26	2.11	-1.72	-0.94	-1.26	-1.58	-1.11	-8.44
POOL ELEVATION													
END OF MONTH	1270.75	1270.70	1270.13	1270.20	1270.31	1272.13	1273.69	1273.18	1273.11	1272.33	1271.73	1271.13	
MAXIMUM	1271.27	1270.75	1270.70	1270.20	1270.91	1272.13	1282.49	1279.29	1276.14	1273.86	1272.33	1271.73	
MINIMUM	1270.72	1270.60	1270.10	1270.06	1269.96	1270.03	1272.13	1272.99	1273.00	1272.33	1271.64	1271.13	
POOL CONTENT-EOM (1000AC.FT)	38.49	38.34	36.69	36.89	37.21	42.61	47.51	45.88	45.66	43.23	41.40	39.60	

MARION LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1938 THRU 1971	3.16	1.28	1.49	1.94	2.08	3.31	5.91	8.70	10.17	7.13	1.78	4.79	51.7
FY 1983	0.17	0.77	1.57	0.91	4.13	5.34	28.04	20.87	20.43	0.52	0.57	0.16	83.5
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	0.50	4.27	1.94	0.83	2.85	2.26	7.81	6.60	6.81	10.12	0.78	0.59	45.4
FY 1983	0.70	0.18	0.06	0.06	0.06	0.06	22.48	18.81	18.53	0.80	0.80	0.54	63.1
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.47	1.56	1.06	0.77	0.97	1.76	2.81	4.51	4.80	3.90	3.28	3.84	31.73
FY 1983	0.87	0.97	0.99	0.17	2.22	1.54	5.24	3.46	5.75	0.13	1.21	2.44	24.99
DEVIATION	-1.60	-0.59	-0.07	-0.60	1.25	-0.22	2.43	-1.05	0.95	-3.77	-2.07	-1.40	-6.74
POOL ELEVATION													
END OF MONTH	1348.91	1348.83	1348.96	1349.00	1349.59	1350.19	1350.80	1350.76	1350.65	1349.91	1349.19	1348.62	
MAXIMUM	1349.34	1348.93	1348.96	1349.03	1349.59	1350.19	1352.67	1352.67	1351.93	1350.65	1349.91	1349.19	
MINIMUM	1348.87	1348.75	1348.83	1348.91	1349.00	1349.59	1350.19	1350.47	1350.50	1349.91	1349.19	1348.62	
POOL CONTENT-EOM (1000AC.FT)	74.33	73.77	74.50	74.71	78.22	91.82	95.60	85.36	84.67	80.11	75.85	72.58	

JOHN REDMOND DAM AND RES	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1922 THRU 1991	71.02	55.44	38.06	36.84	40.33	87.60	126.29	136.01	165.24	118.01	39.59	70.27	984.7
FY 1983	6.80	6.62	15.93	11.40	46.02	57.39	535.34	322.29	250.82	80.86	8.52	5.98	1348.0
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	11.86	54.19	28.44	14.31	51.04	71.01	135.80	140.85	172.09	152.45	23.96	24.76	880.8
FY 1983	2.07	1.49	5.83	20.27	49.40	41.85	382.25	447.58	297.11	80.60	4.59	2.61	1334.7
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.65	1.67	1.16	0.88	0.96	1.96	3.05	4.55	4.95	3.89	3.43	4.17	33.32
FY 1983	0.72	0.71	1.53	0.21	0.73	1.36	4.98	3.68	4.48	1.39	1.15	2.55	23.49
DEVIATION	-1.93	-0.96	0.37	-0.67	-0.23	-0.60	1.93	-0.87	-0.47	-2.50	-2.28	-1.62	-9.83
POOL ELEVATION													
END OF MONTH	1039.29	1039.64	1040.45	1039.47	1039.01	1040.34	1050.99	1040.48	1034.52	1034.03	1034.08	1034.15	
MAXIMUM	1039.29	1039.64	1040.85	1040.45	1040.51	1040.43	1057.97	1050.99	1040.87	1038.32	1034.15	1034.27	
MINIMUM	1039.01	1039.24	1039.64	1039.01	1038.96	1038.84	1040.32	1037.54	1033.98	1033.96	1033.99	1033.98	
POOL CONTENT-end													
(1000AC.FT)	74.02	77.32	85.23	75.72	71.38	84.13	225.96	85.53	36.32	33.14	33.47	33.92	

PENSACOLA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1991	322.60	323.22	236.46	249.34	281.52	462.47	648.79	692.47	729.00	403.86	171.64	260.79	4782.2
FY 1983	34.51	85.88	551.01	184.86	455.12	426.74	1979.90	1333.68	574.21	314.38	40.26	27.37	6017.9
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	123.96	207.13	181.76	129.70	220.32	375.49	569.63	477.14	505.97	577.43	226.75	163.53	3758.8
FY 1983	60.89	55.34	360.12	198.80	430.20	402.39	1645.99	1472.69	713.44	361.29	168.24	41.93	5961.3
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.46	2.62	1.93	1.74	1.75	2.86	4.08	5.19	5.32	3.64	3.37	4.83	40.77
FY 1983	1.24	2.99	3.20	0.19	1.10	2.56	6.26	4.44	3.44	2.22	1.63	1.62	30.89
DEVIATION	-2.20	0.37	1.27	-1.55	-0.65	-0.30	2.19	-0.75	-1.88	-1.42	-1.74	-3.21	-9.88
POOL ELEVATION													
END OF MONTH	738.51	739.10	742.38	742.93	742.45	742.86	749.62	746.48	743.08	741.45	737.83	737.07	
MAXIMUM	739.55	739.10	743.46	743.38	745.91	743.06	750.80	749.66	746.48	744.93	741.45	737.85	
MINIMUM	738.45	737.73	739.10	742.61	742.23	740.98	742.86	746.35	743.08	741.45	737.72	737.07	
POOL CONTENT-end													
(1000AC.FT)	1391.40	1415.10	1546.10	1577.92	1556.80	1574.84	1837.62	1742.04	1584.60	1513.35	1364.37	1334.73	

LAKE HUDSON	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1922 THRU 1981	366.07	326.50	276.23	277.65	316.68	493.77	703.76	798.60	797.85	469.55	232.23	292.51	5351.4
FY 1983	66.54	74.58	453.32	244.56	630.35	508.36	1903.93	1701.56	805.88	388.17	175.74	36.10	6989.1
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	131.84	233.89	207.12	146.43	273.30	443.66	723.29	566.43	647.42	614.67	230.68	168.95	4387.7
FY 1983	57.22	69.92	443.07	253.93	631.85	508.46	1801.96	1763.16	839.31	371.27	166.87	35.15	6942.2
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.86	2.93	2.21	1.97	2.11	3.12	4.32	5.50	5.22	3.20	3.43	4.88	42.75
FY 1983	1.11	4.67	3.93	0.55	1.63	2.71	4.90	4.13	2.80	0.45	1.78	1.59	30.26
DEVIATION	-2.75	1.74	1.72	-1.41	-0.48	-0.41	0.58	-1.37	-2.42	-2.75	-1.65	-3.29	-12.49
POOL ELEVATION													
END OF MONTH	619.77	620.02	620.70	619.73	619.32	619.12	627.52	622.29	618.80	619.50	619.77	619.46	
MAXIMUM	619.95	622.20	621.16	620.91	621.64	620.76	627.52	627.52	622.42	619.98	620.10	620.05	
MINIMUM	618.62	619.13	619.80	619.12	619.10	618.74	619.12	620.19	618.70	618.80	618.89	619.20	
POOL CONTENT-EOM (1000AC.FT)	208.81	211.58	219.32	208.37	203.84	201.63	306.22	238.00	198.16	205.83	208.81	205.38	

FORT GIBSON LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1980	392.66	377.51	305.41	312.54	355.69	546.77	797.48	887.79	880.74	507.86	248.96	323.89	5937.3
FY 1983	45.42	75.37	444.49	256.07	659.11	533.75	1933.88	1905.52	821.35	352.66	154.51	28.96	7211.1
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	145.40	257.00	222.81	160.96	291.08	469.86	742.93	627.51	645.55	682.71	234.07	166.22	4646.1
FY 1983	36.26	70.32	400.05	277.54	680.62	519.07	1755.80	2055.61	799.69	374.47	164.16	24.95	7158.5
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.72	2.90	2.22	1.99	2.15	3.11	4.32	5.40	5.09	3.13	3.25	4.15	41.43
FY 1983	0.65	4.51	2.74	0.45	2.75	2.63	4.05	5.27	2.49	0.85	1.06	1.96	29.47
DEVIATION	-3.07	1.61	0.52	-1.54	0.60	-0.42	-0.27	-0.13	-2.60	-2.28	-2.19	-2.19	-11.96
POOL ELEVATION													
END OF MONTH	554.03	554.15	556.26	555.10	553.87	554.43	562.13	555.02	555.66	554.02	552.97	552.69	
MAXIMUM	554.09	554.38	557.40	556.36	557.84	555.94	562.13	565.08	556.29	555.66	554.46	553.06	
MINIMUM	552.85	553.87	554.10	554.23	553.64	552.74	554.30	554.30	554.74	552.84	552.97	552.33	
POOL CONTENT-EOM (1000AC.FT)	346.94	348.09	409.93	336.50	362.77	373.50	544.97	384.90	397.70	365.58	345.96	340.92	

ARKANSAS RIVER BASIN

WEBBERS FALLS LAD	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1940 THRU 1981	1150.75	1067.84	732.82	658.86	751.95	1291.80	1905.47	2350.06	1996.12	1593.36	687.71	627.23	14937.0
FY 1983	110.68	193.78	771.57	663.27	1730.56	1344.40	5230.40	4933.68	2187.77	1313.65	247.93	90.25	18917.9
RELEASES(1000AC.FT.)													
AVG 1970 THRU 1983	243.24	746.30	454.74	358.06	644.50	1062.86	1800.82	2037.43	2067.69	1597.97	498.10	431.68	12001.5
FY 1983	105.18	190.77	769.63	659.49	1746.17	1329.27	5230.64	4930.02	2179.59	1330.35	240.47	78.63	18880.3
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.52	2.79	2.14	1.93	2.14	2.95	4.30	5.22	5.00	3.11	2.99	4.35	40.44
FY 1983	0.69	4.67	3.04	0.46	3.27	2.29	2.49	6.61	2.44	0.65	0.61	2.00	29.22
DEVIATION	-2.83	1.88	0.90	-1.47	1.13	-0.66	-1.81	1.39	-2.56	-2.46	-2.38	-2.35	-11.22
POOL ELEVATION													
END OF MONTH	499.76	489.78	489.77	489.92	489.27	490.22	489.84	489.67	489.91	487.70	487.71	488.29	
MAXIMUM	490.21	490.14	490.11	490.14	490.09	490.50	490.33	490.33	490.17	490.29	490.01	489.27	
MINIMUM	489.50	489.53	489.43	489.43	489.10	489.29	489.49	489.39	489.48	487.70	487.70	487.55	
POOL CONTENT-END (1000AC.FT)	167.38	167.61	167.49	169.20	161.81	172.77	168.29	166.35	169.08	144.86	144.96	151.07	

ARKANSAS RIVER BASIN

TENKILLER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1981	52.64	73.09	76.11	92.05	97.10	136.73	174.34	188.34	119.59	53.49	40.27	35.47	1129.2
FY 1983	8.53	18.35	200.33	52.56	93.11	74.78	142.21	123.77	43.64	16.07	6.86	3.87	774.1
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	31.90	21.07	44.26	48.08	46.33	62.00	99.77	93.19	72.99	59.65	50.33	28.37	657.7
FY 1983	12.94	3.50	70.69	97.94	85.08	84.22	81.35	121.48	64.29	48.80	53.45	23.03	746.8
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.71	3.16	2.65	2.26	2.69	3.50	4.70	5.63	4.86	3.22	3.38	4.43	44.19
FY 1983	1.77	4.54	4.57	0.11	1.71	1.44	3.25	4.33	2.89	0.95	0.87	1.23	27.66
DEVIATION	-1.94	1.38	1.92	-2.15	-0.98	-2.06	-1.45	-1.30	-1.97	-2.27	-2.51	-3.20	-16.53
POOL ELEVATION													
END OF MONTH	623.77	624.90	635.10	631.60	631.32	630.35	634.78	634.53	632.55	629.48	624.99	622.87	
MAXIMUM	624.42	624.90	635.10	635.75	634.44	632.33	635.79	635.64	634.58	632.71	629.48	624.99	
MINIMUM	623.63	623.76	624.90	631.30	631.32	630.22	630.35	633.09	632.37	629.48	624.99	622.86	
POOL CONTENT-END (1000AC.FT)	564.13	567.24	634.75	648.86	645.19	633.00	690.52	687.24	661.30	622.30	568.28	543.73	

CONCHAS LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1940 thru 1983	16.6	20.1	18.6	10.0	3.7	3.5	5.1	8.2	15.0	23.0	33.3	16.3	172.2
FY 1983	3.9	3.8	3.7	4.8	5.4	7.3	22.5	21.9	29.8	8.3	5.6	2.4	118.7
Releases (1000 Ac-Ft)													
Avg 1941 thru 1983	4.3	1.1	.9	.8	.9	.7	13.7	10.8	8.2	8.3	9.2	12.7	73.9
FY 1983	6.7	.30	.05	0	0	0	2.4	13.5	5.9	14.9	15.3	19.5	78.4
Rainfall (Inches)													
Avg 1940 thru 1983	.94	.44	.41	.32	.36	.59	.85	1.37	1.47	2.45	2.42	1.43	13.02
FY 1983	1.63	1.17	.86	.76	.77	1.38	.63	.98	1.77	.53	1.73	.26	12.74
Pool Elevation (EOM)	4189.90	4190.03	4190.37	4190.84	4191.32	4191.84	4193.93	4194.37	4196.58	4195.08	4193.21	4190.29	
Maximum	4190.75	4190.03	4190.37	4190.84	4191.32	4191.84	4193.93	4194.42	4196.81	4196.55	4195.05	4193.12	4196.81
Minimum	4189.90	4189.89	4190.04	4190.38	4190.85	4191.33	4191.88	4194.00	4194.41	4195.08	4193.21	4190.29	4189.89
Pool Content (EOM) (1000 Ac-Ft)	236.4	237.3	239.8	243.3	246.9	250.9	267.3	270.9	289.5	276.8	261.6	239.2	

SANFORD RESERVOIR

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1981	21.36	3.42	1.97	3.18	2.09	2.53	11.47	35.88	38.51	37.66	35.93	30.86	224.9
FY 1983	19.24	15.27	10.02	10.66	14.70	10.69	8.60	7.99	12.98	2.91	1.55	0.36	115.0
RELEASES(1000AC.FT.)													
LAKE HAS NOT FILLED													
RAINFALL(INCHES)													
AVG 1930 THRU 1977	1.36	0.56	0.50	0.43	0.47	0.67	1.13	2.[illegible]		2.75	2.48	1.65	16.79
FY 1983	1.66	0.56	0.80	0.66	0.96	1.24	0.69	1.	.	.92	1.63	1.06	15.04
DEVIATION	0.29	0.00	0.30	0.23	0.49	0.57	-0.44	-0.[illegible]	0.[illegible]9	1.83	-0.85	-0.59	-1.75
POOL ELEVATION													
END OF MONTH	2907.79	2908.42	2908.77	2909.17	2909.87	2910.02	2909.73	2909.30	2909.20	2907.74	2906.22	2904.77	
MAXIMUM	2907.84	2908.43	2908.86	2909.17	2909.91	2910.10	2910.02	2909.73	2909.55	2909.20	2907.74	2906.22	
MINIMUM	2906.83	2907.79	2908.42	2908.70	2909.17	2909.87	2909.73	2909.28	2909.15	2907.72	2906.22	2904.77	
POOL CONTENT-EOM (1000AC.FT)	437.81	444.92	448.90	453.44	461.57	463.30	459.95	454.98	453.82	437.24	420.41	404.76	

ARKANSAS RIVER BASIN

NORMAN RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.-FT.)													
AVG 1926 THRU 1981	3.80	0.90	1.60	1.10	2.10	4.20	9.50	13.70	12.10	4.40	0.70	2.40	56.5
FY 1983	0.01	2.42	4.93	5.08	7.05	10.13	6.72	18.73	2.28	0.03	3.95	0.00	61.3
RELEASES(1000AC.FT.)													
AVG 1975 THRU 1983	0.00	0.00	0.00	0.00	0.38	0.82	0.66	1.73	3.63	1.41	0.00	0.00	9.6
FY 1983	0.00	0.00	0.00	0.00	3.02	6.60	5.28	7.37	5.62	0.00	0.00	0.00	27.9
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.96	2.03	1.52	1.31	1.53	2.23	3.52	5.33	4.30	2.93	2.66	3.60	33.92
FY 1983	0.71	3.20	2.99	1.33	3.49	3.38	3.05	6.02	2.81	0.35	4.31	1.43	33.09
DEVIATION	-2.23	1.17	1.47	0.02	1.96	1.15	-0.47	0.69	-1.49	-2.58	1.65	-2.17	-0.83
POOL ELEVATION													
END OF MONTH	1037.40	1037.50	1038.03	1038.61	1039.08	1039.31	1039.11	1040.32	1039.21	1038.37	1038.19	1037.45	
MAXIMUM	1037.89	1037.50	1038.03	1038.61	1039.32	1039.86	1039.37	1041.18	1040.32	1039.21	1038.45	1038.19	
MINIMUM	1037.34	1037.23	1037.50	1038.03	1038.61	1038.98	1038.98	1038.98	1039.12	1038.37	1037.87	1037.45	
POOL CONTENT-END (1000AC.FT)	110.12	110.70	113.78	117.26	120.09	121.49	120.27	127.78	120.88	115.82	114.74	110.41	

ARKANSAS RIVER BASIN

OPTIMA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1939 THRU 1981	2.10	0.82	0.96	0.89	1.05	1.05	1.57	5.60	6.75	3.77	3.36	3.30	31.2
FY 1983	0.00	0.00	0.00	0.00	0.92	0.39	0.59	0.68	0.60	0.49	0.00	0.08	3.5
RELEASES(1000AC.FT.)													
LAKE HAS NOT FILLED													
RAINFALL(INCHES)													
AVG 1930 THRU 1977	1.17	0.58	0.41	0.35	0.42	0.76	1.21	2.55	2.24	2.73	2.45	1.67	16.55
FY 1983	1.23	0.46	0.68	0.39	0.76	1.07	0.72	1.31	4.33	0.91	1.81	0.69	14.36
DEVIATION	0.06	-0.12	0.27	0.03	0.34	0.31	-0.49	-1.24	2.09	-1.82	-0.64	-0.98	-2.19
POOL ELEVATION													
END OF MONTH	2720.20	2719.80	2719.50	2719.20	2720.00	2719.80	2720.00	2720.10	2720.10	2719.60	2718.60	2718.00	
MAXIMUM	2720.70	2720.20	2719.80	2719.50	2720.10	2720.00	2720.00	2720.10	2720.20	2720.10	2719.60	2718.60	
MINIMUM	2720.20	2719.50	2719.50	2719.20	2719.20	2719.80	2719.80	2719.90	2720.00	2719.60	2718.60	2718.00	
POOL CONTENT-END (1000AC.FT)	5.87	5.43	5.20	4.97	5.67	5.48	5.67	5.77	5.77	5.29	4.38	3.87	

FORT SUPPLY LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.-FT.)													
AVG 1923 THRU 1981	5.95	3.34	1.83	1.92	3.26	3.01	4.63	12.05	11.42	4.28	3.50	3.59	58.8
FY 1983	0.62	1.23	1.90	2.39	2.46	3.07	4.04	2.92	5.88	2.19	0.07	0.99	27.8
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	0.04	0.67	0.66	0.91	1.64	1.77	2.70	11.15	4.63	0.74	0.39	0.35	25.7
FY 1983	0.15	0.15	0.12	0.70	2.27	2.18	3.83	2.11	3.30	1.93	0.00	0.17	16.9
RAINFALL(INCHES)													
AVG 1930 THRU 1977	1.61	0.96	0.66	0.55	0.80	1.14	1.72	3.47	3.09	2.47	2.47	1.86	20.80
FY 1983	0.35	0.56	0.55	0.26	1.29	1.71	1.01	2.01	4.54	1.11	1.23	2.46	17.08
DEVIATION	-1.26	-0.40	-0.11	-0.29	0.49	0.57	-0.71	-1.46	1.45	-1.36	-1.24	0.60	-3.72
POOL ELEVATION													
END OF MONTH	2002.77	2003.14	2003.94	2004.63	2004.58	2004.70	2004.32	2004.17	2004.86	2004.08	2003.33	2003.15	
MAXIMUM	2002.95	2003.15	2003.94	2004.65	2004.80	2004.75	2004.82	2004.44	2005.14	2004.84	2004.08	2003.39	
MINIMUM	2002.60	2002.66	2003.14	2003.94	2004.58	2004.49	2004.00	2004.10	2004.17	2004.07	2003.33	2003.02	
POOL CONTENT-END OF MONTH (1000AC.FT)	11.70	12.33	13.78	15.11	15.01	15.25	14.51	14.22	15.56	14.04	12.68	12.35	

CANTON LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1981	16.09	5.83	3.96	4.22	5.63	9.35	13.53	34.74	36.74	27.60	9.76	11.25	179.7
FY 1983	0.33	1.94	3.68	5.22	6.51	16.54	16.45	20.59	28.07	7.92	1.07	0.41	108.7
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	4.15	3.93	5.26	2.70	1.09	2.99	9.21	4.88	14.66	6.69	1.44	4.81	61.8
FY 1983	0.61	0.59	0.61	0.61	0.55	7.32	21.46	16.75	20.72	6.12	0.40	0.36	76.1
RAINFALL(INCHES)													
AVG 1930 THRU 1977	1.49	0.92	0.60	0.51	0.71	1.09	1.64	3.20	2.81	2.58	2.54	1.83	19.91
FY 1983	0.70	0.57	0.63	0.34	1.39	2.32	1.31	2.25	4.94	0.77	1.14	2.36	18.72
DEVIATION	-0.79	-0.35	0.03	-0.17	0.68	1.23	-0.33	-0.95	2.13	-1.81	-1.40	0.53	-1.19
POOL ELEVATION													
END OF MONTH	1614.13	1614.04	1614.30	1614.80	1615.44	1616.39	1615.50	1615.53	1615.86	1615.35	1614.73	1614.18	
MAXIMUM	1614.60	1614.19	1614.35	1614.80	1615.44	1616.49	1616.74	1616.46	1616.38	1615.87	1615.35	1614.73	
MINIMUM	1614.11	1613.91	1614.06	1614.30	1614.77	1615.44	1615.37	1615.39	1615.40	1615.35	1614.73	1614.17	
POOL CONTENT-END OF MONTH (1000AC.FT)	101.53	101.15	102.93	106.65	111.67	119.34	112.15	112.33	115.09	110.96	106.11	101.91	

EUFAULA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1923 THRU 1981	332.39	246.54	202.92	218.33	262.43	353.60	536.38	766.88	603.75	252.71	144.26	212.12	4122.4
FY 1983	19.04	113.65	302.28	123.57	803.90	311.01	446.68	1236.49	313.78	68.83	9.42	1.72	3750.4
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	91.63	116.27	68.67	101.74	152.17	119.58	137.57	466.66	581.48	264.13	179.03	66.14	2355.1
FY 1983	23.73	9.62	38.33	138.11	525.27	436.44	211.41	1119.66	401.69	211.87	245.85	101.19	3463.3
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.24	2.42	1.92	1.64	1.98	2.71	3.91	5.44	4.39	3.10	2.90	4.03	37.68
FY 1983	0.77	3.53	2.59	0.57	3.10	2.05	2.40	6.84	2.74	0.67	1.40	1.94	28.60
DEVIATION	-2.47	1.11	0.67	-1.07	1.12	-0.66	-1.51	1.40	-1.65	-2.43	-1.50	-2.09	-9.08
POOL ELEVATION													
END OF MONTH	580.07	581.03	583.72	583.41	586.02	584.58	586.56	587.25	585.99	584.00	580.90	579.30	
MAXIMUM	580.45	581.03	583.72	583.86	587.21	586.20	586.56	589.82	587.25	586.07	584.00	580.90	
MINIMUM	579.98	579.88	581.03	582.73	583.41	584.09	584.58	585.66	585.89	584.00	580.90	579.30	
POOL CONTENT-END (1000AC.FT)	1964.04	1948.42	2201.11	2170.80	2435.71	3287.20	3432.73	3566.72	3432.56	2228.50	1936.92	1798.05	

R.S.KERR LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1943 THRU 1981	1293.00	1231.74	1064.24	954.67	1176.02	1953.52	2466.04	3141.04	2757.85	2170.09	986.93	1279.80	20484.9
FY 1983	141.02	219.77	1038.94	827.11	2437.29	1879.34	5315.30	6175.14	2509.09	1472.53	555.77	213.02	22784.3
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	402.91	879.91	587.98	507.17	877.57	1319.69	2070.78	2704.81	2773.84	1866.31	715.51	508.82	15235.3
FY 1983	131.51	208.38	1043.29	791.87	2430.60	1852.93	5313.04	5144.65	2506.05	1435.15	535.45	210.38	22603.4
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.69	3.05	2.63	2.16	2.64	3.42	4.63	5.55	4.64	3.21	3.24	4.27	43.13
FY 1983	1.51	4.28	4.59	0.54	2.72	2.06	2.77	5.57	3.12	1.47	0.84	1.36	30.85
DEVIATION	-2.18	1.23	1.96	-1.60	0.08	-1.36	-1.86	0.02	-1.52	-1.74	-2.40	-2.91	-12.28
POOL ELEVATION													
END OF MONTH	456.91	459.00	458.92	459.86	459.85	460.15	459.90	460.20	459.78	460.05	459.96	459.60	
MAXIMUM	459.29	459.92	460.36	459.85	460.40	460.35	460.55	460.38	460.29	460.45	460.21	460.07	
MINIMUM	458.65	458.90	458.17	458.09	459.20	459.00	459.51	459.47	459.10	458.45	458.83	459.34	
POOL CONTENT-END (1000AC.FT)	478.94	482.59	479.26	519.65	519.22	532.46	521.38	534.71	516.20	527.94	523.96	508.45	

ARKANSAS RIVER BASIN

W.D. MAYO LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1943 THRU 1981	1296.93	1308.95	1072.34	1000.13	1200.22	2018.50	2575.19	3157.14	2710.16	2122.46	974.74	1253.55	20680.3
FY 1983	130.31	224.13	1078.21	847.14	2479.54	1942.41	5108.03	5911.34	2557.29	1495.34	574.21	217.78	22565.7
RELEASES(1000AC.FT.)													
AVG 1975 THRU 1983	453.53	897.36	643.34	563.66	937.75	1414.94	2082.68	2622.60	2848.28	1906.47	770.30	553.34	15594.3
FY 1983	130.21	222.81	1077.55	846.82	2479.96	1962.33	5107.24	5910.50	2556.21	1494.70	573.03	216.97	22558.3
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.45	3.29	2.76	2.26	2.83	3.63	4.54	5.48	4.31	3.19	3.08	4.17	42.99
FY 1983	2.30	5.12	4.51	0.83	2.26	2.42	3.21	4.44	2.88	1.12	1.79	1.81	32.69
DEVIATION	-1.15	1.83	1.75	-1.43	-0.57	-1.21	-1.33	-1.04	-1.43	-2.07	-1.29	-2.36	-10.30
POOL ELEVATION													
END OF MONTH	412.56	412.54	413.00	413.00	412.54	412.33	412.50	412.56	412.84	412.59	412.73	412.86	
MAXIMUM	413.09	413.09	413.09	413.30	413.06	413.21	413.28	413.00	413.09	413.32	413.13	413.25	
MINIMUM	412.00	412.24	412.12	411.83	411.90	412.23	411.38	411.11	412.16	412.18	412.05	412.04	
POOL CONTENT-EOM (1000AC.FT)	15.04	15.04	15.77	15.77	15.04	14.70	14.97	15.07	15.51	15.12	15.34	15.55	

ARKANSAS RIVER BASIN

MASTER LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1938 THRU 1981	16.76	50.47	65.96	57.53	93.38	126.43	132.44	134.46	60.21	21.41	9.21	17.46	797.7
FY 1983	2.84	17.69	272.63	33.54	72.59	76.76	107.50	313.19	26.91	33.58	3.64	0.31	961.2
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	14.74	10.29	77.97	42.04	70.33	100.73	62.76	112.08	107.16	22.74	6.89	4.55	632.3
FY 1983	1.04	4.93	259.67	84.94	71.09	77.15	83.70	228.83	86.34	35.40	1.77	1.17	936.0
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.44	3.56	3.14	2.74	3.17	3.98	4.69	5.73	4.13	3.59	3.36	4.17	45.72
FY 1983	1.86	5.27	7.15	0.32	1.51	1.72	3.46	8.01	3.54	2.97	2.23	1.30	39.36
DEVIATION	-1.58	1.71	4.01	-2.42	-1.66	-2.26	-1.23	2.28	-0.59	-0.62	-1.13	-2.87	-6.36
POOL ELEVATION													
END OF MONTH	477.45	477.03	480.53	472.34	472.47	472.00	476.24	485.22	478.69	477.94	477.69	477.19	
MAXIMUM	477.69	479.07	491.13	480.53	474.37	478.86	477.90	490.87	495.22	480.66	477.94	477.70	
MINIMUM	477.41	477.46	477.32	471.70	471.45	471.75	471.99	474.70	478.11	477.94	477.64	477.19	
POOL CONTENT-EOM (1000AC.FT)	58.51	70.24	42.88	30.19	30.73	28.69	50.54	130.70	67.62	61.94	60.19	56.69	

LOCK AND DAM NO. 13	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.													
Avg 1971 thru 1983		185.8	1,750.8	1,406.3	1,632.3	2,810.9	2,846.9	3,284.1	3,392.6	1,731.1	738.4	745.3	23,657.5
WY 1983		248.2	1,686.4	1,066.7	2,828.8	2,297.8	5,665.3	6,338.2	2,841.3	1,658.8	571.9	205.5	25,563.4
Project Rainfall (inches													
Avg 1972 thru 1983	.3	4.4	2.7	1.8	2.2	4.2	2.9	5.0	3.9	3.1	2.2	3.6	39.3
WY 1983	2.9	6.5	7.6	0.7	2.1	2.2	3.0	5.0	2.5	2.8	.8	2.6	38.7
Deviation	-0.4	+2.1	+4.9	-1.1	-0.1	-2.0	+0.1	+0.0	-1.4	-0.3	-1.4	-1.0	-0.6
Pool Elevation													
End of Month	391.02	392.35	392.44	392.68	391.96	391.93	389.55	389.10	391.78	392.59	392.83	392.80	
Maximum	392.24	392.50	393.20	393.10	392.76	392.35	391.93	390.94	392.09	392.90	393.37	393.18	
Minimum	391.02	391.00	390.78	391.94	389.24	390.32	388.78	388.68	389.10	390.94	392.45	392.45	
Pool Content EOM (1,000 AC. FT.)	52.6	61.6	62.2	63.9	58.9	58.6	44.0	41.5	57.6	63.2	64.9	64.7	

GRAND-JOHN TAYLOR LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1972 thru 1983	1,025.1	2,357.6	2,029.0	1,476.6	1,805.8	3,150.1	3,195.0	3,643.4	3,668.3	1,843.9	818.7	777.6	25,791.1
WY 1983	202.1	384.9	2,222.2	1,178.6	3,101.7	2,525.8	5,724.3	7,273.6	3,123.9	1,799.2	584.7	216.3	28,337.3
Project Rainfall (inches)													
Avg 1973 thru 1983	3.5	4.9	3.7	2.2	2.6	4.7	3.3	3.2	4.5	3.5	2.3	3.9	44.1
WY 1983	4.6	5.8	12.6	0.7	2.7	2.6	3.3	5.3	3.0	3.5	2.0	2.4	48.5
Deviation	+1.1	+0.9	+8.9	-1.5	+0.3	-2.1	0.0	+0.1	-1.5	0.0	-0.3	-1.5	+4.1
Pool Elevation													
End of Month	371.80	372.38	372.12	372.45	372.34	372.40	372.63	371.54	372.21	372.48	371.58	371.65	
Maximum	371.99	372.38	372.69	372.86	372.80	372.80	372.94	372.63	372.70	372.93	372.72	372.73	
Minimum	370.60	370.69	370.80	370.40	371.75	371.15	371.50	371.44	371.51	370.82	370.14	370.28	
Pool Content EOM (1,000 AC. FT.)	146.5	152.8	149.8	153.7	152.4	153.1	155.8	143.9	150.9	154.0	144.3	145.0	

BARBANELLE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1966 thru 1983	1,159.0	2,029.3	1,928.1	1,535.2	1,792.0	2,734.4	3,069.0	3,528.5	3,172.8	1,727.6	873.4	817.6	24,366.9
WY 1983	155.7	441.6	2,999.3	1,170.9	2,994.1	2,481.0	5,964.1	6,971.7	2,849.2	1,619.1	1,587.4	233.2	29,467.3
Project Rainfall (inches)													
Avg 1971 thru 1983	3.9	4.8	4.9	2.6	2.8	5.2	4.2	5.8	4.7	2.3	2.9	3.8	47.9
WY 1983	2.6	6.4	15.6	0.6	1.8	2.5	6.4	9.7	5.3	2.5	0.8	0.9	55.1
Deviation	-1.3	+1.6	+10.7	-2.0	-1.0	-2.7	+2.2	+3.9	+0.6	+2.5	-2.1	-2.9	+7.2
Pool Elevation													
End of Month	337.45	337.94	338.45	337.53	338.28	337.60	338.03	338.03	337.55	338.31	337.78	337.45	
Maximum	337.67	338.13	338.77	338.51	338.60	338.54	338.51	338.28	338.24	338.49	338.33	338.04	
Minimum	336.59	337.13	337.05	336.45	336.70	336.29	337.56	337.50	336.96	337.05	336.77	337.42	
Pool Content EOM (1,000 AC. FT.)	467.8	484.2	502.0	470.5	496.1	472.8	487.3	487.3	471.1	497.1	478.8	467.8	

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BLUE MOUNTAIN LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1948 thru 1983	6.6	20.6	33.7	38.5	44.2	63.3	55.7	57.2	16.8	11.1	5.3	5.1	358.1
WY 1983	0.2	5.1	176.4	16.9	43.0	36.0	63.4	124.3	5.1	20.4	2.6	0.0	493.4
Releases (1,000 AC. FT.)													
Avg 1948 thru 1983	5.3	13.0	31.9	36.1	41.2	48.4	43.7	52.6	37.5	18.9	12.2	6.8	347.6
WY 1983	0.5	3.0	93.4	99.6	42.3	37.0	45.3	59.9	75.6	22.3	3.8	1.0	483.7
Basin Rainfall (inches)													
Avg 1948 thru 1983	3.2	3.4	3.4	2.6	2.8	4.0	4.2	5.3	3.5	4.1	3.3	3.5	43.3
WY 1983	2.4	6.0	12.1	1.2	2.9	2.6	4.9	8.9	2.3	4.3	3.5	1.6	52.7
Deviation	-0.8	+2.6	+8.7	-1.4	+0.1	-1.4	+0.7	+4.6	-1.2	+0.2	+0.2	-1.9	+9.4
Pool Elevation													
End of Month	384.02	384.61	402.38	384.45	384.56	384.05	389.31	401.77	386.66	385.68	384.87	384.23	
Maximum	384.30	385.17	407.57	402.38	388.14	389.47	391.22	405.01	401.77	391.24	386.08	384.87	
Minimum	383.97	383.00	384.34	384.32	384.07	384.05	384.03	388.51	386.58	385.68	384.85	384.23	
Pool Content EOM (1,000 AC. FT.)	24.7	26.5	109.2	26.0	26.5	24.8	42.3	105.1	33.0	29.8	27.3	25.3	

LOCK AND DAM NO. 9	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1970 thru 1983	1,268.6	2,413.7	2,679.6	1,698.5	1,855.6	3,165.1	3,444.1	3,843.5	3,618.9	1,751.2	797.8	854.2	27,390.8
WY 1983	138.8	425.7	3,743.3	1,323.6	2,806.7	2,393.1	5,548.5	7,093.3	3,083.5	1,806.0	696.1	292.7	29,351.3
Project Rainfall (inches)													
Avg 1971 thru 1983	3.5	4.5	4.6	2.6	2.6	4.5	4.1	5.1	4.7	2.6	2.8	3.8	45.4
WY 1983	2.1	7.3	14.6	0.5	2.0	1.6	4.7	6.5	3.7	1.5	.7	.5	45.7
Deviation	-1.4	+2.8	+10.0	-2.1	-0.6	-2.9	+0.6	+1.4	-1.0	-1.1	-2.1	-3.3	+0.3
Pool Elevation													
End of Month	286.50	286.64	286.74	286.80	286.51	287.11	284.64	283.48	287.44	286.97	287.47	286.82	
Maximum	287.99	287.54	297.00	287.72	287.40	287.35	287.11	285.65	387.63	287.67	288.10	287.97	
Minimum	284.68	285.00	284.20	284.26	285.30	285.03	283.89	282.68	283.05	285.10	285.10	285.37	
Pool Content EOM (1,000 AC. FT.)	61.8	62.6	63.2	63.5	61.9	65.2	50.1	46.2	67.2	64.4	67.3	63.6	

TOAD SUCK FERRY LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1970 thru 1983	1,196.1	2,447.7	2,373.9	1,880.8	2,034.6	3,488.2	3,639.6	4,005.1	3,703.2	2,339.5	805.0	870.3	28,784.0
WY 1983	139.8	496.0	3,800.4	1,520.9	2,970.9	2,582.0	5,877.4	7,425.1	3,015.8	1,813.5	672.2	285.6	30,599.6
Project Rainfall (inches)													
Avg 1971 thru 1983	1.9	5.0	4.6	2.8	2.8	4.7	4.3	5.3	5.0	2.3	2.4	3.7	44.8
WY 1983	3.5	7.5	11.2	.9	2.2	2.2	6.4	6.8	4.0	.7	1.5	.4	47.3
Deviation	+1.6	+2.5	+6.6	-1.9	-0.6	-2.5	+2.1	+1.5	-1.0	-1.6	-0.9	-3.3	+2.5
Pool Elevation													
End of Month	265.31	265.20	267.08	264.98	264.96	265.05	267.00	265.31	264.97	265.20	265.24	265.10	
Maximum	265.81	265.57	267.51	367.50	265.38	265.58	268.46	270.00	265.56	265.68	265.56	265.56	
Minimum	264.93	264.80	264.10	264.02	264.36	264.20	264.15	264.22	263.80	264.30	264.60	264.22	
Pool Content EOM (1,000 AC. FT.)	34.3	33.9	47.3	32.9	32.8	33.2	46.9	34.3	32.9	33.9	34.0	33.4	

NIMROD LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1944 thru 1983	10.8	34.7	66.1	67.5	85.5	101.2	90.1	98.8	36.2	13.6	6.1	7.4	618.0
WY 1983	0.7	46.9	396.6	30.0	71.5	53.8	90.7	184.7	37.3	59.1	0.0	-1.0	970.3
Releases (1,000 AC. FT.)													
Avg 1944 thru 1983	8.7	24.5	59.4	65.3	76.4	98.6	92.5	96.3	51.3	25.7	11.1	9.8	526.0
WY 1983	0.3	12.6	249.3	206.6	72.3	53.7	73.9	152.2	48.5	84.2	1.7	0.0	955.3
Basin Rainfall (inches)													
Avg 1944 thru 1983	3.4	3.7	3.8	3.1	3.4	4.9	4.7	5.8	4.0	4.1	3.1	3.7	47.7
WY 1983	2.2	7.3	13.3	1.3	2.9	2.7	4.8	12.7	4.5	4.9	1.2	1.5	59.3
Deviation	-1.1	+3.6	+9.5	-1.8	-0.5	-2.2	+0.1	+6.9	+0.5	+0.8	-1.9	-2.2	+11.6
Pool Elevation													
End of Month	341.70	348.95	364.87	342.54	342.17	342.01	345.82	351.03	349.04	343.67	342.89	342.16	
Maximum	342.07	350.20	374.08	364.87	345.96	347.90	349.80	358.78	351.03	351.20	343.68	342.91	
Minimum	341.60	341.59	347.40	342.23	341.93	341.98	341.91	345.10	344.59	343.67	342.23	342.16	
Pool Content EOM (1,000 AC. FT.)	27.9	61.9	208.1	30.9	29.6	29.0	45.1	75.2	62.5	35.4	32.2	29.6	

MURRAY LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1970 thru 1983	1,333.7	2,472.9	2,680.5	1,979.3	2,149.4	3,629.7	3,841.8	4,392.7	3,640.9	1,765.2	595.5	193.1	28,874.7
WY 1983	116.8	512.0	5,064.9	1,778.8	3,157.1	2,647.6	6,398.2	8,331.7	3,253.2	1,783.4	785.1	871.4	34,700.2
Project Rainfall (inches)													
Avg 1970 thru 1983	3.8	5.1	4.3	3.1	2.8	4.3	5.4	5.8	4.1	2.5	2.4	3.3	44.0
WY 1983	3.1	7.6	11.8	0.7	2.5	3.5	5.4	7.0	2.5	1.0	1.4	0.7	47.2
Deviation	-0.7	+2.5	+7.5	-2.4	-0.3	-0.8	0.0	+1.2	-1.6	-1.5	-1.0	-2.6	+3.2
Pool Elevation													
End of Month	249.79	249.74	250.98	250.37	248.92	249.89	249.18	246.23	249.25	250.80	249.53	250.18	
Maximum	249.98	250.21	254.52	251.50	250.50	250.04	249.89	249.21	250.58	251.08	251.00	250.53	
Minimum	249.56	249.20	247.38	250.08	248.43	248.30	247.05	246.00	246.00	248.87	249.21	249.37	
Pool Content EOM (1,000 AC. FT.)	95.3	94.7	108.3	101.5	86.4	96.3	89.0	63.6	89.7	106.3	92.6	99.4	

DAVID D. TERRY LOCK AND DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1969 thru 1983	1,250.4	2,352.3	2,768.4	2,189.9	2,402.5	3,704.8	3,936.4	4,388.4	4,000.0	1,905.2	822.8	879.7	30,600.8
WY 1983	111.6	537.5	5,020.2	1,712.9	2,913.5	2,645.2	6,182.4	8,693.3	3,268.1	1,803.2	546.0	181.7	33,615.6
Project Rainfall (inches)													
Avg 1971 thru 1983	3.5	4.9	4.3	3.8	2.8	4.4	5.0	5.5	4.4	3.3	2.4	3.2	47.5
WY 1983	2.5	8.1	10.5	1.3	2.9	3.7	5.8	7.3	2.9	2.0	.4	1.1	48.5
Deviation	-1.0	4.7	6.2	-2.5	+0.1	-0.7	+0.8	+1.8	-1.5	-1.3	-2.0	-1.1	+1.0
Pool Elevation													
End of Month	231.02	230.89	233.61	232.61	230.91	231.23	229.96	229.10	231.14	230.92	231.25	231.08	
Maximum	231.51	231.59	237.31	234.29	233.27	231.45	231.24	230.82	231.50	231.56	231.65	231.52	
Minimum	230.90	230.55	230.00	232.55	230.66	230.05	229.56	227.98	228.90	230.78	230.52	231.04	
Pool Content EOM (1,000 AC. FT.)	49.6	49.1	63.0	57.5	49.2	50.6	45.5	41.7	50.1	49.2	50.7	49.9	

LOCK AND DAM NO. 5	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1970 thru 1983	1,304.5	2,508.0	2,628.1	2,066.1	2,092.6	3,732.2	3,944.0	4,349.7	3,907.4	1,858.7	816.6	904.4	30,112.3
WY 1983	142.3	598.8	4,899.2	1,920.0	3,137.1	2,789.0	5,967.1	8,051.4	3,100.6	1,796.7	559.3	182.7	33,144.2
Project Rainfall (inches)													
Avg 1972 thru 1983	3.6	4.8	4.7	3.3	3.2	4.6	4.8	6.0	3.9	3.5	2.1	3.5	48.0
WY 1983	3.5	5.8	13.4	1.2	4.4	3.6	6.6	6.3	3.0	4.9	1.5	1.3	55.5
Deviation	-0.1	+1.0	+8.7	-2.1	+1.2	-1.0	+1.8	+0.3	-0.9	+1.4	-0.6	-2.2	+7.5
Pool Elevation													
End of Month	213.08	213.29	213.56	213.98	212.86	213.30	211.72	211.23	212.95	213.17	214.00	213.27	
Maximum	213.29	213.49	217.05	214.65	214.36	213.51	213.58	212.84	213.63	213.62	214.00	214.00	
Minimum	213.08	212.37	210.67	213.74	212.32	212.11	211.09	210.26	211.06	212.78	213.07	213.21	
Pool Content EOM (1,000 AC. FT.)	61.9	63.4	65.3	68.4	60.4	63.5	53.3	50.4	61.0	62.5	68.5	63.2	

ARKANSAS RIVER BASIN

LOCK AND DAM NO. 4	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1970 thru 1983	1,310.1	2,537.4	2,697.0	2,136.5	2,304.1	3,846.0	4,109.6	4,501.6	4,068.0	1,890.9	820.3	915.8	31,137.3
WY 1983	123.6	590.9	5,237.0	2,051.1	3,385.7	2,970.1	6,345.3	8,188.1	3,267.1	1,860.8	538.6	171.6	34,729.9
Project Rainfall (inches)													
Avg 1972 thru 1983	3.6	4.4	4.7	3.9	3.2	4.7	4.7	6.4	3.8	3.5	2.9	4.5	50.1
WY 1983	3.9	6.1	12.2	1.1	4.3	2.9	7.2	9.5	2.7	5.2	.10	3.5	58.7
Deviation	+0.3	+1.7	+7.5	-2.8	+1.1	-1.8	+2.5	+3.1	-1.1	+1.7	-1.8	-1.0	+8.6
Pool Elevation													
End of Month	196.32	195.87	196.58	196.60	195.79	196.16	194.32	194.30	196.46	196.51	196.2	196.25	
Maximum	196.41	196.50	199.60	197.12	197.02	196.40	196.40	195.69	196.68	196.68	196.7	196.51	
Minimum	195.82	195.63	194.16	196.28	195.36	195.31	194.10	193.30	194.20	195.87	195.5	196.10	
Pool Content EOM (1,000 AC. FT.)	72.5	69.7	74.2	74.4	69.3	71.5	61.3	61.2	73.4	73.8	72.0	72.1	

LOCK AND DAM NO. 3	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1970 thru 1983	1,305.6	2,541.4	2,724.0	2,131.4	2,317.4	3,853.1	4,179.1	4,614.7	4,101.5	1,905.1	809.9	898.4	31,381.6
WY 1983	100.6	579.9	5,471.5	1,871.2	3,242.6	2,852.1	6,599.5	8,630.5	3,489.7	1,882.7	560.8	153.1	35,434.2
Project Rainfall (inches)													
Avg 1971 thru 1983	3.5	4.3	4.3	3.9	2.9	4.6	4.5	5.6	3.6	3.4	3.3	3.9	47.8
WY 1983	4.2	3.9	10.8	0.8	4.3	2.4	7.2	10.0	2.5	2.0	0	4.4	52.5
Deviation	+0.7	-0.4	+5.5	-3.1	+1.4	-2.2	+2.7	+4.4	-1.1	-1.4	-3.3	+0.5	+4.7
Pool Elevation													
End of Month	182.08	182.10	182.65	182.72	181.86	181.92	180.60	180.10	182.17	182.65	182.04	182.46	
Maximum	182.40	182.44	182.12	182.90	182.80	182.42	182.00	183.30	182.56	182.66	182.66	182.78	
Minimum	181.65	181.08	181.10	182.18	180.45	181.06	180.28	179.60	180.10	181.85	181.58	182.02	
Pool Content EOM (1,000 AC. FT.)	46.7	46.8	49.0	49.3	45.9	46.1	41.2	39.6	47.1	49.0	46.6	48.2	

LOCK AND DAM NO. 2	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Releases (1,000 AC. FT.)													
Avg 1970 thru 1983	1,303.7	2,540.5	2,833.3	2,136.9	2,379.1	3,924.4	4,311.0	4,197.2	4,124.3	1,898.0	809.1	184.3	30,641.8
WY 1983	126.9	548.9	5,837.6	2,085.4	3,234.1	2,756.4	6,559.3	9,342.3	3,587.9	1,798.0	527.1	184.3	36,588.2
Project Rainfall (inches)													
Avg 1971 thru 1983	3.7	5.3	5.2	4.9	4.0	6.6	5.3	5.5	4.4	3.2	3.1	4.0	55.2
WY 1983	6.6	5.5	14.6	1.2	5.4	3.5	7.5	5.5	4.3	1.6	.7	4.2	60.6
Deviation	+2.9	+0.2	+9.4	-3.7	+1.4	-3.1	+2.2	0	-0.1	-1.6	-2.4	+0.2	+5.4
Pool Elevation													
End of Month	162.32	161.99	161.79	162.05	161.57	162.37	161.91	160.20	163.99	163.32	163.17	163.18	
Maximum	162.50	162.41	169.21	162.98	162.32	162.78	162.37	162.36	164.00	164.03	163.53	163.56	
Minimum	161.90	161.84	160.90	161.44	160.80	161.16	160.82	160.00	156.84	161.99	162.97	162.28	
Pool Content EOM (1,000 AC. FT.)	113.7	110.0	107.9	110.7	105.5	114.2	109.1	91.9	133.1	125.0	123.2	123.4	

HORSELL LOCK NO. 1 (No basic data collected)

ALTUS LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.-FT.)													
AVG 1938 THRU 1981	7.13	2.75	3.44	3.77	5.05	5.93	9.57	29.65	20.95	8.39	3.01	3.01	102.7
FY 1983	0.34	0.66	2.25	4.16	6.88	11.06	6.35	11.40	8.37	0.44	0.36	0.14	52.4
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	0.07	0.11	0.07	0.00	0.18	0.76	0.63	22.37	7.15	11.13	8.49	0.63	51.6
FY 1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.06	0.89	0.79	0.62	0.82	1.14	2.02	3.93	3.22	2.22	2.57	2.34	22.62
FY 1983	0.20	0.94	0.46	0.27	1.12	1.72	0.39	2.42	2.24	0.15	0.77	0.87	11.55
DEVIATION	-1.86	0.05	-0.33	-0.35	0.30	0.58	-1.63	-1.51	-0.98	-2.07	-1.80	-1.47	-11.07
POOL ELEVATION													
END OF MONTH	1546.87	1546.81	1547.23	1548.10	1549.65	1551.52	1552.38	1553.95	1555.03	1549.26	1541.51	1537.32	
MAXIMUM	1547.37	1546.87	1547.23	1548.10	1549.65	1551.52	1552.38	1553.95	1555.10	1555.03	1549.26	1541.51	
MINIMUM	1546.87	1546.66	1546.80	1547.23	1548.10	1549.65	1551.52	1552.30	1553.95	1549.26	1541.51	1537.32	
POOL CONTENT-END (1000AC.FT)	71.82	71.58	73.32	77.01	83.91	92.77	97.05	105.20	111.08	82.14	51.79	38.60	

MOUNTAIN PARK DAM	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1926 THRU 1981	1.51	0.45	0.36	0.25	0.33	0.66	1.38	5.73	4.07	1.28	0.73	1.77	18.5
FY 1983	0.00	0.50	0.21	1.34	1.21	2.50	1.01	2.45	6.35	0.35	0.35	0.00	16.2
RELEASES(1000AC.FT.)													
AVG 1931 THRU 1983	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.07	0.40	1.30	0.00	0.00	1.9
FY 1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.59	1.34	1.13	1.01	1.17	1.55	2.46	4.67	3.40	2.28	2.27	2.98	26.85
FY 1983	0.16	1.35	1.11	1.44	1.73	2.82	1.01	3.10	3.20	0.33	1.02	0.72	17.99
DEVIATION	-2.43	0.01	-0.02	0.43	0.56	1.27	-1.45	-1.57	-0.20	-1.95	-1.25	-2.26	-8.86
POOL ELEVATION													
END OF MONTH	1408.90	1408.71	1408.54	1408.60	1408.65	1408.81	1408.57	1408.44	1408.99	1408.19	1407.43	1406.72	
MAXIMUM	1409.44	1408.90	1408.73	1408.62	1408.70	1408.84	1408.81	1408.57	1409.00	1408.99	1408.19	1407.43	
MINIMUM	1408.90	1408.60	1408.54	1408.49	1408.60	1408.57	1408.57	1408.32	1408.35	1408.19	1407.43	1406.72	
POOL CONTENT-END (1000AC.FT)	76.22	75.14	74.11	74.52	74.86	75.71	74.35	73.61	76.74	72.18	67.98	64.16	

LAKE KEMP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1924 THRU 1981	22.20	5.94	6.74	3.73	5.53	7.68	12.78	38.02	25.28	15.57	18.91	27.01	189.4
FY 1983	0.76	3.48	3.00	6.29	4.27	7.95	9.25	14.36	15.29	1.64	0.00	0.00	66.3
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	0.90	0.48	2.06	0.00	0.50	3.59	3.82	2.76	7.21	15.53	12.92	6.41	59.2
FY 1983	6.45	0.00	0.00	0.00	0.00	0.00	4.03	5.66	6.26	12.54	15.22	10.87	61.0
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.51	1.06	0.97	0.82	0.99	1.10	1.94	3.56	2.70	2.01	2.15	2.88	22.69
FY 1983	0.09	0.69	0.38	0.22	0.66	1.08	0.65	1.41	1.97	0.56	0.29	0.50	8.50
DEVIATION	-2.42	-0.37	-0.59	-0.60	-0.33	-0.02	-1.29	-2.15	-0.73	-1.45	-1.86	-2.38	-14.19
POOL ELEVATION													
END OF MONTH	1140.91	1140.93	1141.06	1141.41	1141.65	1141.88	1141.80	1141.85	1141.94	1140.28	1137.95	1135.97	
MAXIMUM	1141.77	1140.95	1141.08	1141.41	1141.68	1141.89	1142.15	1141.91	1142.00	1141.94	1140.28	1137.95	
MINIMUM	1140.90	1140.65	1140.93	1141.03	1141.41	1141.64	1141.80	1141.34	1141.51	1140.28	1137.95	1135.97	
POOL CONTENT-END													
(1000AC.FT)	223.00	223.27	224.76	229.94	233.30	236.52	235.40	236.10	237.36	214.62	186.16	165.93	

MAURICE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1925 THRU 1981	7.81	4.14	3.26	1.71	3.76	5.22	7.51	26.25	17.73	3.32	1.70	4.28	86.7
FY 1983	0.06	1.66	3.36	4.13	9.88	5.14	5.65	27.21	10.33	0.81	0.72	0.06	69.0
RELEASES(1000AC.FT.)													
AVG 1983	0.00	0.00	0.00	0.00	0.00	0.00	1.32	21.91	5.03	0.00	0.00	0.00	28.3
FY 1983	0.00	0.00	0.00	0.00	0.00	0.00	1.32	21.91	5.03	0.00	0.00	0.00	28.3
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.05	1.76	1.47	1.29	1.47	1.93	2.78	5.11	3.56	2.38	2.38	3.34	30.52
FY 1983	0.82	2.86	1.58	0.95	2.62	1.70	1.41	4.52	4.01	0.58	1.83	0.29	23.18
DEVIATION	-2.23	1.10	0.11	-0.33	1.15	-0.23	-1.37	-0.59	0.45	-1.80	-0.55	-3.05	-7.34
POOL ELEVATION													
END OF MONTH	950.06	950.01	950.15	950.41	951.21	951.42	951.66	951.61	951.64	951.00	950.40	949.52	
MAXIMUM	950.54	950.15	950.16	950.41	951.31	951.52	951.88	952.79	952.12	951.73	951.09	950.42	
MINIMUM	949.97	949.78	949.94	950.14	950.41	951.10	951.40	951.34	951.50	950.98	950.35	949.52	
POOL CONTENT-END													
(1000AC.FT)	189.12	188.60	190.06	192.76	201.08	203.27	205.76	205.24	205.56	198.90	192.66	183.84	

FOSS RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1926 THRU 1980	2.53	1.79	1.23	1.31	1.73	2.86	9.34	15.36	12.37	3.69	3.11	2.87	59.3
FY 1983	0.71	1.36	2.58	3.22	4.00	7.22	5.81	6.99	24.47	1.72	2.10	0.12	60.3
RELEASES(1000AC.FT.)													
AVG 1978 THRU 1983	2.12	0.25	0.21	0.24	0.51	0.23	1.03	3.39	12.99	3.50	0.47	0.33	25.3
FY 1983	0.31	0.30	0.31	0.31	0.28	0.31	5.16	2.15	16.75	11.05	0.61	0.59	38.1
RAINFALL(INCHES)													
AVG 1930 THRU 1977	1.98	1.09	0.76	0.63	0.89	1.26	2.29	4.05	3.14	2.00	2.49	2.27	22.83
FY 1983	0.12	0.67	0.21	0.18	0.65	1.50	0.27	2.55	4.09	0.10	0.41	0.59	11.34
DEVIATION	-1.86	-0.41	-0.55	-0.45	-0.23	0.24	-2.02	-1.50	0.95	-1.90	-2.08	-1.68	-11.49
POOL ELEVATION													
END OF MONTH	1638.70	1638.60	1638.80	1639.12	1639.60	1640.39	1640.10	1640.32	1641.00	1638.77	1638.24	1637.54	
MAXIMUM	1639.05	1638.70	1638.80	1639.12	1639.60	1640.39	1640.55	1640.35	1642.26	1641.00	1638.77	1638.24	
MINIMUM	1638.70	1638.45	1638.60	1638.77	1639.12	1639.60	1640.10	1639.60	1639.54	1638.77	1638.24	1637.54	
POOL CONTENT-FOM (1000AC.FT)	156.59	155.97	157.20	159.19	162.21	167.27	165.39	166.81	171.22	157.02	153.76	149.54	

RED RIVER BASIN

FORT COBB RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1926 THRU 1941	2.94	1.88	2.05	2.27	2.39	3.09	4.10	6.26	5.89	2.86	1.85	2.41	38.0
FY 1983	0.02	0.99	1.16	2.22	2.13	4.33	2.81	3.52	9.18	0.37	0.07	0.00	26.8
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.25	6.86	1.01	0.00	0.00	8.2
FY 1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	0.00	0.00	2.8
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.47	1.37	1.19	0.99	1.11	1.60	2.63	4.62	3.25	2.37	2.50	3.17	27.27
FY 1983	0.55	2.19	0.80	0.70	1.35	1.98	1.32	4.34	6.03	0.08	1.95	0.58	21.87
DEVIATION	-1.92	0.82	-0.39	-0.29	0.24	0.38	-1.31	-0.28	2.78	-2.29	-0.55	-2.59	-5.40
POOL ELEVATION													
END OF MONTH	1340.27	1340.14	1340.19	1340.52	1340.80	1341.46	1341.62	1341.85	1342.88	1342.09	1341.21	1340.28	
MAXIMUM	1340.79	1340.27	1340.20	1340.52	1340.80	1341.46	1341.63	1341.85	1343.20	1342.88	1342.09	1341.21	
MINIMUM	1340.27	1340.05	1340.13	1340.19	1340.52	1340.80	1341.46	1341.42	1341.81	1342.09	1341.21	1340.28	
POOL CONTENT-FOM (1000AC.FT)	72.11	72.70	72.82	74.11	75.20	77.83	78.48	79.40	93.67	80.38	76.83	73.17	

RED RIVER BASIN

ARBUCKLE RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1926 THRU 1981	3.80	3.24	3.29	3.07	4.90	5.63	8.07	12.49	7.59	2.94	2.12	3.74	60.9
FY 1983	0.39	0.69	0.68	2.58	5.89	6.41	6.87	39.63	4.52	1.22	1.20	0.00	70.1
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	1.99	0.70	0.32	0.12	1.79	1.06	2.94	12.02	10.73	0.38	0.31	0.14	32.5
FY 1983	0.06	0.06	0.06	0.06	2.32	4.26	6.73	38.54	2.92	0.06	0.06	0.06	55.2
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.16	2.32	2.10	1.76	2.21	2.90	3.95	5.55	3.85	2.57	2.86	3.80	37.03
FY 1983	0.80	2.67	1.62	1.16	3.50	2.33	2.27	9.60	3.86	0.57	2.22	1.09	31.69
DEVIATION	-2.36	0.35	-0.48	-0.60	1.29	-0.57	-1.68	4.05	0.01	-2.00	-0.64	-2.71	-5.34
POOL ELEVATION													
END OF MONTH	870.36	870.18	870.14	871.01	872.00	872.57	872.19	872.34	872.18	871.82	871.45	870.61	
MAXIMUM	870.80	870.36	870.23	871.01	872.60	873.00	872.85	881.31	872.48	872.23	871.82	871.45	
MINIMUM	870.27	870.02	870.07	870.14	871.01	872.00	871.97	872.04	871.95	871.82	871.45	870.61	
POOL CONTENT-EOM (1000AC.FT)	68.62	68.21	68.12	70.10	72.40	73.76	72.85	73.21	72.83	71.98	71.12	69.19	

RED RIVER BASIN

LAKE TEXOMA	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1906 THRU 1991	366.34	199.55	180.83	140.89	166.47	227.04	413.04	812.92	688.44	214.49	177.99	240.90	3828.9
FY 1983	30.35	86.58	110.58	89.45	193.19	212.03	223.14	680.33	398.08	149.47	44.13	11.46	2228.8
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	219.37	172.96	106.15	112.84	96.30	81.79	117.23	359.73	785.82	318.76	146.60	101.08	2608.6
FY 1983	91.72	44.74	72.93	87.91	56.21	170.36	162.48	436.04	392.33	365.37	135.29	77.39	2092.8
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.58	1.38	1.23	1.13	1.29	1.62	2.52	4.28	3.30	2.25	2.34	2.92	26.83
FY 1983	0.57	1.81	1.04	0.73	1.69	2.00	1.30	3.57	3.18	0.71	1.04	0.88	18.57
DEVIATION	-2.01	0.43	-0.19	-0.35	0.41	0.38	-1.22	-0.71	-0.12	-1.54	-1.30	-2.04	-8.26
POOL ELEVATION													
END OF MONTH	614.14	614.45	614.61	614.52	616.08	616.22	616.57	618.90	618.50	615.39	613.66	612.29	
MAXIMUM	615.23	614.56	614.87	614.76	616.08	617.16	617.04	619.45	618.90	618.50	615.39	613.66	
MINIMUM	614.14	614.12	614.45	614.12	614.52	616.00	616.22	616.19	617.44	615.43	613.66	612.29	
POOL CONTENT-EOM (1000AC.FT)	2409.72	2433.90	2446.38	2439.36	2553.72	2575.83	2606.10	2816.28	2779.40	2508.00	2372.89	2269.85	

PAT MAYSE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1937 THRU 1981	4.59	7.23	7.99	6.33	11.73	12.30	16.04	15.77	10.14	3.64	1.49	4.15	101.8
FY 1983	0.33	11.97	24.51	0.23	43.54	30.92	2.45	16.19	5.44	6.03	0.32	0.08	142.1
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	0.45	2.77	2.83	1.43	4.99	10.63	8.56	9.30	13.98	6.93	0.85	0.00	62.8
FY 1983	0.00	0.14	15.43	6.33	17.24	42.92	9.47	6.47	6.34	7.14	0.18	0.00	111.5
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.22	3.32	3.15	2.75	3.10	3.75	4.85	5.27	4.06	3.36	2.71	4.18	43.72
FY 1983	1.64	3.79	2.24	0.26	6.39	3.63	1.99	3.95	4.27	2.87	1.60	1.45	34.13
DEVIATION	-1.58	0.47	-0.91	-2.49	3.29	-0.07	-2.86	-1.32	0.21	-0.49	-1.11	-2.73	-9.59
POOL ELEVATION													
END OF MONTH	449.70	451.45	452.72	451.37	455.47	453.16	451.62	452.60	452.05	451.26	450.56	449.87	
MAXIMUM	450.12	451.45	453.23	452.72	456.65	457.07	453.20	452.89	452.60	452.73	451.26	450.56	
MINIMUM	449.70	449.69	451.45	451.30	451.37	452.90	451.62	451.41	451.45	451.26	450.56	449.87	
POOL CONTENT-END													
(1000AC.FT)	116.86	127.24	135.06	126.75	152.61	137.82	128.28	134.32	130.91	126.09	121.90	117.85	

SAKAKAWEA LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1926 THRU 1981	9.07	15.39	20.38	21.73	26.99	30.93	39.85	39.52	19.88	6.87	2.66	9.87	245.9
FY 1983	0.62	5.55	69.28	9.10	48.66	23.19	35.58	81.28	7.73	0.58	0.53	0.08	282.2
RELEASES(1000AC.FT.)													
LAKE HAS NOT FILLED													
RAINFALL(INCHES)													
AVG 1930 THRU 1977	2.38	3.49	2.80	1.30	3.03	3.64	4.84	5.89	4.40	3.60	3.34	4.56	44.27
FY 1983	1.46	4.20	5.73	0.63	3.05	2.08	2.51	7.69	2.86	1.65	0.98	1.79	34.67
DEVIATION	-1.93	0.71	2.93	-0.62	0.02	-1.56	-2.33	1.80	-1.54	-1.95	-2.36	-2.77	-9.60
POOL ELEVATION													
END OF MONTH	534.63	538.00	554.10	566.72	576.61	580.24	584.66	592.63	592.71	591.73	591.17	590.71	
MAXIMUM	536.00	545.00	555.50	566.72	576.61	580.24	584.66	592.63	592.79	592.72	591.73	591.17	
MINIMUM	534.10	534.40	537.00	554.10	566.72	576.61	580.24	584.66	592.49	591.73	591.17	590.71	
POOL CONTENT-END													
(1000AC.FT)	0.00	0.07	24.22	33.09	81.19	103.03	136.54	218.03	218.99	207.52	201.14	195.98	

HUGO LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1926 THRU 1964	40.79	74.01	117.34	160.37	177.57	171.23	257.85	250.16	114.02	56.90	19.14	49.05	1485.4
FY 1983	5.29	58.93	364.54	65.18	246.74	160.64	99.91	367.83	59.66	46.69	11.23	4.35	1491.0
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1993	32.67	39.74	97.18	74.23	153.14	189.63	229.99	212.49	160.39	54.95	18.03	13.07	1265.5
FY 1983	8.97	11.54	325.21	104.85	229.49	175.84	100.37	360.25	54.51	45.17	18.34	13.08	1447.6
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.67	3.76	3.20	2.89	3.30	3.92	5.12	5.99	4.33	3.61	3.42	4.55	47.76
FY 1983	1.85	4.59	5.60	0.64	3.12	2.75	1.96	7.45	4.20	2.65	2.06	1.62	38.51
DEVIATION	-1.82	0.83	2.40	-2.23	-0.19	-1.17	-3.16	1.46	-0.13	-0.96	-1.36	-2.93	-9.25
POOL ELEVATION													
END OF MONTH	401.59	405.22	407.93	405.09	406.20	404.84	404.66	404.83	404.88	404.54	403.52	402.41	
MAXIMUM	402.20	405.22	411.83	407.93	411.60	408.52	405.77	411.88	405.90	405.92	404.54	403.52	
MINIMUM	401.57	401.55	404.56	404.52	404.44	404.57	404.55	404.53	404.38	404.54	403.49	402.41	
POOL CONTENT-END (1000AC.FT)	121.55	167.29	206.56	165.39	190.86	162.14	159.71	162.00	162.68	158.09	144.85	131.14	

PINE CREEK LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1929 THRU 1981	22.63	38.04	56.04	60.24	78.03	82.93	95.41	104.78	42.28	17.31	8.38	22.66	628.7
FY 1983	1.31	38.58	136.13	32.03	70.06	65.99	60.11	169.11	39.85	23.31	3.94	0.07	620.5
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	19.93	9.42	40.51	38.75	58.34	81.93	75.84	95.62	75.09	15.86	6.38	5.01	522.7
FY 1983	4.00	8.75	133.32	58.39	72.15	54.27	30.86	158.22	41.52	38.15	4.10	3.87	607.6
RAINFALL(INCHES)													
AVG 1930 THRU 1977	3.80	3.90	3.59	3.17	3.52	4.25	5.24	6.12	4.36	3.91	3.66	4.63	50.15
FY 1983	1.48	4.64	5.09	0.67	1.82	2.86	1.45	6.15	2.84	2.62	1.37	1.16	32.15
DEVIATION	-2.32	0.74	1.50	-2.50	-1.70	-1.39	-3.79	0.03	-1.52	-1.29	-2.29	-3.47	-18.00
POOL ELEVATION													
END OF MONTH	436.85	443.80	444.77	438.85	438.26	440.81	442.65	444.47	443.83	440.20	439.34	438.02	
MAXIMUM	437.82	444.01	449.30	444.77	440.95	445.68	443.70	455.62	444.64	445.89	440.21	439.34	
MINIMUM	436.85	436.82	438.17	438.04	438.09	438.25	440.44	442.65	442.55	440.20	439.34	438.02	
POOL CONTENT-END (1000AC.FT)	49.59	79.22	94.24	57.01	54.72	65.15	73.57	82.67	79.37	62.54	58.99	53.83	

BROKEN BOW LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
INFLOWS(1000AC.FT.)													
AVG 1930 THRU 1981	36.81	58.40	95.11	111.71	114.40	140.87	130.35	138.16	52.17	26.71	14.15	23.55	940.4
FY 1983	2.75	112.36	276.79	25.92	67.79	122.16	88.62	267.31	40.09	116.51	0.97	0.82	1122.1
RELEASES(1000AC.FT.)													
AVG 1976 THRU 1983	22.71	19.92	64.76	65.42	56.14	91.11	103.92	107.15	112.54	63.64	42.95	24.22	774.1
FY 1983	13.84	13.20	198.66	79.01	35.93	142.59	62.83	242.42	58.21	145.27	80.81	27.85	1101.6
RAINFALL(INCHES)													
AVG 1930 THRU 1977	4.20	4.08	4.12	3.76	3.85	4.86	5.32	6.15	4.38	4.25	3.82	4.53	53.32
FY 1983	2.36	7.02	6.07	0.19	1.92	3.66	3.11	7.96	5.20	6.68	1.72	1.26	47.15
DEVIATION	-1.84	2.94	1.95	-3.57	-1.93	-1.20	-2.21	1.81	0.82	2.43	-2.10	-3.27	-6.17
POOL ELEVATION													
END OF MONTH	598.46	595.99	601.46	597.20	599.35	597.58	599.17	600.57	598.76	596.77	589.97	587.22	
MAXIMUM	599.58	595.99	607.61	601.44	599.69	605.47	599.19	608.53	600.57	606.36	596.77	589.97	
MINIMUM	598.43	588.29	595.99	597.10	597.20	597.56	596.66	599.17	598.08	596.77	589.97	587.22	
POOL CONTENT-END													
(1000AC.FT)	769.60	869.11	946.16	885.81	915.96	891.10	913.41	933.34	907.63	879.86	788.94	753.90	

BRQUEEN LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1930 thru 1983	6.1	13.5	21.3	24.2	24.5	29.8	29.0	30.7	11.1	6.3	3.9	6.2	206.6
WY 1983	1.0	34.0	73.0	5.7	17.3	18.6	14.2	67.7	6.8	57.3	0.8	0.2	296.6
Releases (1,000 AC. FT.)													
Avg 1979 thru 1983	10.5	9.9	27.6	16.5	19.2	23.4	26.6	35.2	33.0	18.4	6.3	1.0	227.6
WY 1983	.4	.4	77.8	19.9	17.0	18.6	13.7	58.9	17.4	62.7	1.5	0.5	288.8
Basin Rainfall (inches)													
Avg 1930 thru 1983	3.8	4.3	4.2	3.8	3.8	4.8	5.3	6.5	4.3	4.4	3.3	4.3	52.8
WY 1983	3.8	8.6	11.1	0.5	3.4	4.0	3.3	11.1	5 9	8.2	2.3	1.6	63.8
Deviation	0.0	+4.3	+6.9	-3.3	-0.4	-0.8	-2.0	+4.6	+1.6	+3.8	-1.0	-2.7	+11.0
Pool Elevation													
End of Month	427.65	447.21	444.90	437.33	437.38	437.19	437.29	441.80	435 48	431.35	430.40	429.77	
Maximum	427.71	447.21	463.93	444.90	438.05	443.35	438.86	455.64	441.80	458.05	431.35	430.40	
Minimum	427.35	427.65	444.90	437.08	436.87	436.90	436.58	437.29	434.57	431.35	430.40	426.99	
Pool Content EOM (1,000 AC. FT.)	21.4	54.9	49.9	35.5	35.6	35.2	35.4	43.6	32.4	26.3	25.0	24.1	

GILLHAM LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1930 thru 1983	11.6	24.4	40.0	46.2	43.7	54.8	49.5	50.6	20.2	11.2	5.2	9.8	367.2
WY 1983	1.8	73.0	176.1	11.0	37.7	26.2	27.8	11.3	15 2	55.1	4.6	0.3	440.1
Releases (1,000 AC. FT.)													
Avg 1977 thru 1983	7.2	15.6	42.4	36.1	32.8	52.6	66.0	57.0	41.7	17.4	11.8	2.7	383.3
WY 1983	1.2	13.8	142.7	85.0	37.9	26.0	27.4	110.2	12 7	71.0	9.0	0.9	537.8
Basin Rainfall (inches)													
Avg 1930 thru 1983	4.0	4.4	4.3	3.9	4.0	5.1	5.4	6.5	4.7	4.4	3.3	4.5	54.5
WY 1983	3.6	9.5	13.3	0.8	3.7	3.3	4.0	11.6	5.5	7.4	0.9	1.5	65.1
Deviation	-0.4	+5.1	+9.0	-3.1	-0.3	-1.8	-1.4	+5.1	+0.8	+3.0	-2.4	-3.0	+10.6
Pool Elevation													
End of Month	486.40	525.40	538.30	502.49	502.25	502.15	502.15	503.52	504.86	491.58	486.42	485.76	
Maximum	486.45	527.44	561.50	538.30	505.90	510.94	505.90	531.22	505.07	526.72	491.58	486.45	
Minimum	485.97	486.40	522.79	502.10	502.01	501.70	501.22	502.15	502.10	491.58	486.41	485.76	
Pool Content EOM (1,000 AC. FT.)	15.9	74.9	107.9	33.7	33.4	33.2	33.2	35.2	37.1	20.7	15.9	15.3	

DIKE LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1930 thru 1983	4.1	9.5	16.2	19.6	17.7	21.9	19.5	21.7	7.5	4.4	1.2	3.2	146.5
WY 1983	.7	18.9	78.5	6.8	14.2	8.3	7.7	37.6	5.1	26.7	0.4	0.5	205.4
Releases (1,000 AC. FT.)													
Avg 1977 thru 1983	3.4	5.1	13.5	16.6	12.9	17.4	17.9	19.3	13.5	10.0	2.7	0.9	133.2
WY 1983	1.1	2.9	40.7	55.4	14.3	8.5	7.2	31.3	8.0	27.6	3.1	1.3	201.4
Basin Rainfall (inches)													
Avg 1930 thru 1983	4.5	4.6	4.4	4.1	4.1	5.0	5.3	6.2	4.9	4.0	3.2	3.9	54.2
WY 1983	4.2	10.1	16.9	0.7	4.5	3.1	5.8	10.7	5.5	7.9	1.5	2.0	72.9
Deviation	-0.3	+5.5	+12.5	-3.4	+0.4	-1.9	+0.5	+4.5	+0.(	+3.9	-1.7	-1.9	+18.7
Pool Elevation													
End of Month	523.02	533.78	551.22	526.57	526.35	525.98	526.06	530.06	527.:5	526.70	524.34	523.38	
Maximum	523.59	534.10	558.00	551.22	527.79	528.69	527.48	539.06	530.(6	541.48	526.70	524.34	
Minimum	522.96	523.01	533.06	526.13	525.89	525.81	529.93	526.05	525.72	526.70	524.32	523.38	
Pool Content EOM (1,000 AC. FT.)	25.8	41.6	79.2	30.4	30.1	29.6	29.7	35.5	32.1	30.6	27.5	26.2	

HILLWOOD LAKE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1,000 AC. FT.)													
Avg 1929 thru 1983	112.3	238.6	382.7	442.9	489.5	571.7	601.8	668.8	297.2	130.7	72.0	98.9	4,107.1
WY 1983	39.4	242.3	1,552.5	507.7	406.0	483.5	269.7	939.3	250.[illegible]	908.3	120.7	41.4	5,761.0
Releases (1,000 AC. FT.)													
Avg 1976 thru 1983	95.1	150.5	383.0	306.2	346.2	448.2	502.1	491.4	442.2	248.2	77.9	60.4	3,551.4
WY 1983	22.2	156.6	1,580.8	480.3	395.6	490.4	254.4	859.7	270.9	920.3	104.0	30.8	5,566.0
Intervening Basin Rainfall (inches)													
Avg 1930 thru 1983	3.7	4.2	3.9	3.6	3.7	4.3	4.8	5.8	4.0	3.5	2.9	3.8	48.2
WY 1983	4.1	8.0	11.5	0.5	3.7	3.8	3.1	8.5	5.2	6.1	1.5	1.6	57.6
Deviation	+0.4	+3.8	+7.6	-3.1	0.0	-0.5	-1.7	+2.7	+1.2	+2.6	-1.4	-2.2	+9.4
Pool Elevation													
End of Month	259.29	261.74	260.70	259.46	259.59	259.05	259.22	261.34	260.27	259.30	259.35	259.27	
Maximum	259.52	261.78	269.17	261.38	259.91	260.96	260.11	261.84	261.34	268.55	259.65	259.86	
Minimum	259.06	258.93	259.62	259.24	259.11	258.98	258.87	259.12	259.30	259.21	259.23	259.08	
Pool Content EOM (1,000 AC. FT.)	207.8	286.1	251.4	212.9	216.8	200.7	205.7	272.5	382.8	208.1	209.6	207.2	

RED RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
WRIGHT PATMAN LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1957 THRU 1982	77	165	220	165	229	257	286	436	195	66	19	38	2155
FY 1983	2	65	903	108	263	400	93	62	63	67	0	0	2026
RELEASES (1000 AC.FT.)													
AVG 1957 THRU 1982	109	152	191	205	216	234	200	274	252	166	52	48	2099
FY 1983	44	55	552	466	150	501	65	2	1	46	15	9	1906
RAINFALL (INCHES)													
AVG 1957 THRU 1977	3.68	3.29	3.65	2.47	3.06	3.93	4.87	4.44	4.25	3.40	2.67	4.66	44.57
FY 1983	3.21	7.39	6.13	0.72	4.46	4.13	1.61	4.84	4.31	2.80	1.34	1.22	44.16
DEVIATION	-0.47	4.10	4.46	-1.75	1.40	0.20	-3.26	0.40	0.06	-0.60	-1.33	-3.64	-0.41
POOL ELEVATION													
END OF MONTH	222.81	222.86	232.76	221.39	225.50	222.40	223.17	225.00	226.60	226.77	225.37	224.40	
MAXIMUM	224.74	222.86	235.67	232.73	226.12	229.79	223.27	225.00	226.58	228.00	226.77	225.35	
MINIMUM	222.81	220.84	222.80	220.67	221.39	222.24	222.39	223.13	225.00	226.58	225.35	224.39	
POOL CONTENT EOM (1000 AC.FT.)	209	210	551	175	263	199	216	268	317	323	279	251	

RED RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
LAKE O THE PINES													
INFLOWS (1000 AC.FT.)													
AVG 1958 THRU 1982	10	25	45	53	56	75	78	64	31	10	5	13	465
FY 1983	9	19	111	23	65	104	33	39	15	11	0	0	449
RELEASES (1000 AC.FT.)													
AVG 1958 THRU 1982	10	15	41	49	54	68	56	56	35	15	11	13	427
FY 1983	8	7	41	67	73	113	30	7	6	12	2	2	368
RAINFALL (INCHES)													
AVG 1957 THRU 1977	3.07	3.53	3.69	2.59	3.16	3.73	4.90	4.01	3.73	2.79	2.33	3.93	41.46
FY 1983	3.40	6.65	9.42	0.84	4.39	4.61	1.18	5.04	4.78	1.68	1.84	0.92	44.75
DEVIATION	0.33	3.12	5.73	-1.75	1.23	0.88	-3.72	1.03	1.05	-1.11	-0.49	-3.01	3.29
POOL ELEVATION													
END OF MONTH	228.60	229.00	232.35	229.25	229.74	229.04	228.02	230.23	230.21	229.83	229.17	228.52	
MAXIMUM	228.91	229.00	232.40	232.59	229.74	231.80	229.04	230.23	230.36	230.60	229.83	229.17	
MINIMUM	228.42	228.55	229.00	229.05	228.70	229.04	228.60	228.84	230.20	229.83	229.17	228.52	
POOL CONTENT EOM (1000 AC.FT.)	257	264	332	249	279	264	263	288	290	280	268	255	

NECHES RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
SAM RAYBURN RESERVOIR													
INFLOWS (1000 AC.FT.)													
AVG 1938 THRU 1982	40	86	172	256	258	282	239	313	136	58	34	32	1356
FY 1983	56	149	656	212	601	378	142	540	244	64	101	42	3185
RELEASES (1000 AC.FT.)													
AVG 1965 THRU 1982	52	42	62	94	114	143	146	209	130	147	143	92	1434
FY 1983	136	112	1	273	267	465	249	65	554	189	107	82	2500
RAINFALL (INCHES)													
AVG 1931 THRU 1960	3.15	4.67	5.02	4.65	4.18	3.69	4.64	5.22	3.55	3.72	2.93	2.87	48.29
FY 1983	5.45	6.73	7.88	1.92	6.32	5.46	1.53	7.83	5.72	1.97	2.01	3.42	56.24
DEVIATION	2.30	2.06	2.86	-2.73	2.14	1.77	-3.11	2.61	2.17	-1.75	-0.92	0.55	7.95
POOL ELEVATION													
END OF MONTH	159.00	159.23	165.05	164.64	167.28	166.18	164.94	168.45	165.48	163.94	163.35	162.64	
MAXIMUM	160.10	159.23	165.08	165.82	167.51	167.28	166.36	168.45	168.45	165.46	163.94	163.40	
MINIMUM	159.00	157.96	159.23	164.49	164.68	164.98	164.75	164.82	165.46	163.94	163.35	162.64	
POOL CONTENT EOM (1000 AC.FT.)	2319	2342	2973	2926	3240	3107	2960	3386	3024	2846	2779	2701	

NECHES RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
B.A. STEINHAGEN LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1906 THRU 1982	74	151	284	438	439	495	514	607	290	141	81	67	3581
FY 1983	158	222	409	549	709	911	472	491	853	296	211	136	5417
RELEASES (1000 AC.FT.)													
AVG 1951 THRU 1982	96	130	234	313	338	376	408	601	294	178	122	108	3138
FY 1983	152	154	423	561	696	916	460	487	840	295	201	132	5317
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.92	4.25	4.71	4.10	3.59	3.92	4.60	5.00	3.43	3.27	2.81	2.85	45.45
FY 1983	4.14	6.79	7.85	1.59	5.85	5.13	0.70	7.91	5.35	2.52	5.17	2.75	55.75
DEVIATION	1.22	2.54	3.14	-2.51	2.26	1.21	-3.90	2.91	1.92	-0.75	2.36	-0.10	10.30
POOL ELEVATION													
END OF MONTH	76.59	83.27	82.05	81.20	82.15	81.15	81.86	81.84	82.53	82.17	82.47	82.50	
MAXIMUM	76.59	83.30	83.71	82.94	83.20	83.05	82.61	83.50	83.11	82.68	83.58	82.83	
MINIMUM	53.00	76.59	81.48	80.03	81.20	80.74	80.80	81.32	81.55	82.01	81.60	81.45	
POOL CONTENT EOM (1000 AC.FT.)	32	98	82	72	83	71	80	79	88	85	87	88	

TRINITY RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
BENBROOK LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1924 THRU 1982	2	3	2	3	6	7	9	14	6	2	1	1	56
FY 1983	0	0	1	1	1	2	1	4	3	0	1	0	14
RELEASES (1000 AC.FT.)													
AVG 1952 THRU 1982	1	4	2	2	4	5	5	10	11	2	2	1	49
FY 1983	0	2	0	0	0	0	0	1	0	0	0	0	3
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.83	2.22	2.30	2.06	2.06	2.36	3.79	4.75	3.28	2.16	2.10	2.44	32.35
FY 1983	1.83	3.18	2.52	0.99	1.40	2.57	0.49	3.03	3.27	1.24	2.87	0.68	24.07
DEVIATION	-1.00	0.96	0.22	-1.07	-0.66	0.21	-3.30	-1.72	-0.01	-0.92	0.77	-1.76	-8.28
POOL ELEVATION													
END OF MONTH	692.58	691.79	691.89	692.07	692.21	692.44	692.25	692.77	693.10	692.46	691.99	691.19	
MAXIMUM	693.03	692.58	691.90	692.07	692.21	692.44	692.44	692.77	693.11	693.10	692.48	692.09	
MINIMUM	692.58	691.73	691.71	691.89	692.07	692.21	692.23	692.12	692.77	692.48	691.99	691.19	
POOL CONTENT EOM													
(1000 AC.FT.)	83	80	80	81	82	82	82	84	85	83	81	78	

TRINITY RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
LEWISVILLE LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1924 THRU 1982	41	30	26	24	42	57	74	99	52	19	11	29	504
FY 1983	8	20	37	23	38	35	17	30	19	10	10	1	248
RELEASES (1000 AC.FT.)													
AVG 1954 THRU 1982	30	45	44	27	25	33	33	71	77	41	31	22	479
FY 1983	15	11	13	6	39	16	26	12	14	20	20	17	209
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.96	2.33	2.53	2.14	2.66	2.53	4.08	5.05	3.88	2.57	2.43	2.88	36.04
FY 1983	1.81	4.14	3.51	1.20	1.96	3.13	0.87	4.31	3.29	1.87	3.19	0.29	29.57
DEVIATION	-1.15	1.81	0.98	-0.94	-0.70	0.60	-3.21	-0.74	-0.59	-0.70	0.76	-2.59	-6.47
POOL ELEVATION													
END OF MONTH	513.75	513.91	514.76	515.36	515.11	515.62	514.81	515.10	514.79	513.64	512.46	511.05	
MAXIMUM	514.99	513.91	514.76	515.36	516.17	515.63	515.80	515.15	515.12	515.85	513.64	512.46	
MINIMUM	513.75	513.50	513.81	514.76	515.16	514.95	515.81	514.51	514.56	513.64	512.46	511.05	
POOL CONTENT EOM													
(1000 AC.FT.)	429	433	452	466	460	472	453	460	453	427	401	372	

TRINITY RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
GRAPEVINE LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1924 THRU 1982	11	6	7	9	13	16	24	30	15	5	2	6	144
FY 1983	0	3	4	3	5	9	4	8	5	1	1	0	43
RELEASES (1000 AC.FT.)													
AVG 1952 THRU 1982	4	8	12	9	6	6	10	12	15	13	11	5	111
FY 1983	2	3	3	2	1	1	2	3	3	4	4	6	34
RAINFALL (INCHES)													
AVG 1931 THRU 1960	3.13	2.19	2.24	1.90	2.26	2.26	3.89	4.45	3.28	2.56	2.48	2.73	33.43
FY 1983	2.36	3.55	3.06	1.14	1.38	3.26	0.72	4.80	4.05	2.11	2.90	0.28	30.21
DEVIATION	-0.77	1.36	0.82	-0.76	-0.88	1.00	-3.17	0.34	0.77	-0.45	0.42	-2.50	-3.22
POOL ELEVATION													
END OF MONTH	533.98	533.72	533.81	533.95	534.30	535.08	534.91	535.18	535.10	534.13	532.95	531.31	
MAXIMUM	534.64	534.05	533.85	533.94	534.31	535.08	535.20	535.29	535.18	535.10	534.13	532.95	
MINIMUM	533.98	533.46	533.57	533.65	533.95	534.29	534.91	534.73	534.79	534.13	532.95	531.31	
POOL CONTENT EOM													
(1000 AC.FT.)	174	172	173	174	176	182	180	182	182	175	166	155	

TRINITY RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
LAVON LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1924 THRU 1982	14	19	23	25	35	37	53	69	37	13	3	12	340
FY 1983	4	11	54	31	90	59	23	30	31	18	4	0	355
RELEASES (1000 AC.FT.)													
AVG 195[illegible] THRU 1982	13	14	26	20	15	21	15	58	37	14	7	4	244
FY 198[illegible]	0	0	0	11	53	69	23	0	12	15	0	0	183
RAINFALL (INCHES)													
AVG 1931 THRU 1960	3.28	2.87	2.99	2.47	2.82	3.37	4.57	5.24	3.99	2.86	2.71	2.67	39.84
FY 1983	2.16	5.25	5.07	1.14	4.02	3.49	0.54	3.93	4.33	2.20	1.88	1.05	35.06
DEVIATION	-1.12	2.38	2.08	-1.33	1.20	0.12	-4.03	-1.31	0.34	-0.66	-0.83	-1.62	-4.78
POOL ELEVATION													
END OF MONTH	490.19	490.19	492.25	492.70	493.90	492.67	491.95	492.52	492.49	491.51	490.50	487.35	
MAXIMUM	490.72	490.36	492.25	492.70	494.25	493.90	492.36	492.57	492.72	492.65	491.51	490.48	
MINIMUM	490.19	489.82	490.19	491.97	492.18	491.95	491.95	491.84	492.09	491.51	490.48	489.35	
POOL CONTENT EOM													
(1000 AC.FT.)	419	419	462	472	499	471	456	468	467	446	426	403	

TRINITY RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
NAVARRO MILLS LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1938 THRU 1982	5	6	8	10	10	12	19	23	14	4	1	3	121
FY 1983	0	1	1	1	26	11	5	8	4	0	1	1	59
RELEASES (1000 AC.FT.)													
AVG 1963 THRU 1982	2	7	6	4	6	7	9	16	22	8	0	2	89
FY 1983	0	0	0	0	6	13	3	1	5	0	0	0	28
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.64	2.60	2.61	2.62	2.80	2.67	4.36	4.98	3.50	1.82	1.60	2.64	34.34
FY 1983	1.80	3.76	2.42	0.93	5.23	3.28	0.76	3.66	2.36	2.92	3.20	0.97	31.79
DEVIATION	-0.84	1.16	-0.19	-1.69	2.43	0.61	-3.60	-1.32	-0.64	1.10	1.60	-1.67	-3.05
POOL ELEVATION													
END OF MONTH	422.22	422.13	422.10	422.03	425.85	424.84	424.63	425.41	424.71	424.06	423.54	423.08	
MAXIMUM	422.71	422.39	422.21	422.11	426.87	425.97	425.18	425.41	425.43	424.71	424.06	423.54	
MINIMUM	422.22	422.04	422.10	421.93	422.03	424.53	424.32	424.30	424.55	423.93	423.44	423.08	
POOL CONTENT EOM (1000 AC.FT.)	46	46	45	45	64	59	58	62	58	55	52	50	

TRINITY RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
BARDWELL LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1938 THRU 1982	3	3	4	4	6	6	11	14	7	2	1	2	63
FY 1983	0	1	2	1	9	8	2	5	13	2	1	0	44
RELEASES (1000 AC.FT.)													
AVG 1965 THRU 1982	1	5	3	3	4	6	6	12	11	2	0	1	54
FY 1983	0	0	0	0	2	5	2	0	11	2	0	0	22
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.90	2.76	2.94	2.53	2.81	2.73	4.11	4.81	3.09	1.98	2.16	2.74	35.53
FY 1983	2.76	3.69	3.05	1.01	3.97	3.03	0.19	4.24	4.35	2.72	3.20	2.12	34.33
DEVIATION	-0.14	0.96	0.11	-1.52	1.16	0.30	-3.92	-0.57	1.26	0.74	1.04	-0.62	-1.20
POOL ELEVATION													
END OF MONTH	419.02	419.04	419.31	419.30	421.12	421.35	420.95	421.79	421.87	421.10	420.89	420.36	
MAXIMUM	419.35	419.16	419.33	419.31	421.55	421.30	421.40	421.79	423.54	421.87	421.10	420.89	
MINIMUM	419.02	419.86	419.04	419.19	419.30	421.01	420.93	420.89	421.23	421.10	420.81	420.36	
POOL CONTENT EOM (1000 AC.FT.)	45	46	46	46	53	54	52	55	55	53	52	50	

SAN JACINTO

BARKER RESERVOIR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac. Ft.)													
Aug. 1945 thru 1983	5.6	6.1	6.3	9.7	7.9	3.8	5.3	8.3	10.1	7.6	4.2	7.8	82.7
FY 1983	7.7	23.2	15.6	8.5	24.8	10.1	1.2	17.9	6.8	15.7	22.5	18.9	172.9
Releases (1000 Ac. Ft.)													
Aug. 1964 thru 1983	7.2	6.9	6.0	8.2	9.0	5.0	4.4	9.6	9.6	7.7	3.9	9.8	87.3
FY 1983	7.6	15.0	23.5	8.4	22.7	10.1	1.2	12.0	12.0	16.1	12.9	25.1	166.6
Rainfall (Inches)													
Aug. 1945 thru 1983	3.62	3.45	3.29	3.07	2.99	3.20	3.24	4.52	3.80	3.20	3.85	4.26	42.50
FY 1983	4.40	7.65	4.06	2.22	4.72	4.13	0.26	6.54	4.45	6.84	8.33	8.28	61.88
Pool Elevation													
End of Month	74.81	87.85	75.24	75.53	74.49	76.03	73.81	86.52	73.92	74.71	88.43	87.11	
Maximum	84.58	88.24	88.07	84.83	85.95	85.67	75.95	88.64	86.33	88.38	90.55	89.78	
Minimum	73.81	74.12	74.26	73.77	74.49	73.80	73.67	73.82	73.90	73.89	73.96	74.01	
Pool Content E.O.M. (1000 AC. Ft.)	0	7.9	0	0	0	0	0	5.0	0	0	9.9	6.3	
ADDICKS RESERVOIR													
Inflows (1000 Ac. Ft.)													
Aug. 1948 thru 1983	6.2	6.1	6.4	6.4	7.4	3.3	5.7	8.3	7.2	5.5	5.9	6.9	75.3
FY 1983	7.9	25.0	14.7	7.6	23.6	9.9	4.0	21.4	5.7	12.9	33.1	20.2	186.0
Releases (1000 Ac. Ft.)													
Aug. 1964 thru 1983	8.2	6.8	6.5	7.4	7.9	3.7	4.8	10.1	7.5	6.0	4.2	8.9	82.0
FY 1983	9.2	7.9	32.3	7.7	21.0	9.0	4.5	17.1	11.7	12.8	17.9	27.6	178.7
Rainfall (Inches)													
Aug. 1948 thru 1983	3.90	3.46	3.36	3.04	3.16	2.19	3.38	4.30	3.72	3.20	3.48	4.47	41.66
FY 1983	5.11	8.63	3.30	3.22	4.35	4.66	0.18	7.17	5.94	6.01	10.01	8.00	66.58
Pool Elevation													
End of Month	72.78	94.10	75.55	73.84	72.25	81.87	71.67	90.40	71.87	72.26	92.99	89.78	
Maximum	88.22	94.10	94.84	85.68	89.41	88.44	81.51	92.89	90.19	91.20	95.73	92.99	
Minimum	71.75	71.67	72.10	71.83	72.19	71.68	71.65	71.64	71.69	71.74	72.51	71.75	
Pool Content E.O.M. (1000 Ac. Ft.)	0	17.1	0	0	0	0.4	0	6.4	0	0	12.9	5.4	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
WHITNEY LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1939 THRU 1982	120	68	67	55	60	68	135	279	170	99	72	108	1301
FY 1983	8	15	19	17	20	39	29	85	44	35	18	11	340
RELEASES (1000 AC.FT.)													
AVG 1951 THRU 1982	99	57	39	51	43	55	61	216	180	33	53	71	1008
FY 1983	23	25	25	63	29	27	22	21	27	45	33	5	345
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.38	1.94	2.16	1.96	2.35	2.06	3.49	4.76	2.97	2.07	1.31	2.76	31.11
FY 1983	1.95	3.42	2.37	1.08	1.26	2.68	0.49	3.77	2.08	1.01	2.21	0.65	22.37
DEVIATION	-0.93	1.48	0.21	-0.88	-1.09	0.62	-3.00	-0.99	-0.89	-1.06	0.40	-2.11	-8.14
POOL ELEVATION													
END OF MONTH	528.29	527.63	527.18	524.56	523.85	524.33	524.23	527.23	527.61	526.42	525.00	524.34	
MAXIMUM	529.51	528.75	527.97	527.25	524.56	525.57	524.71	527.35	527.78	527.31	526.42	525.31	
MINIMUM	528.26	527.32	527.17	524.56	523.35	523.84	523.85	524.14	527.27	526.42	524.95	524.34	
POOL CONTENT EOM (1000 AC.FT.)	523	510	501	453	441	450	448	503	503	487	461	458	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
AQUILLA													
INFLOWS (1000 AC.FT.)													
AVG 1982 THRU 1982	0	0	0	0	0	0	0	0	0	0	0	0	0
FY 1983	0	0	0	0	0	0	0	0	0	0	0	0	0
RELEASES (1000 AC.FT.)													
AVG 1982 THRU 1982	0	0	0	0	0	0	0	0	0	0	0	0	0
FY 1983	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINFALL (INCHES)													
AVG 1931 THRU 1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FY 1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEVIATION	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POOL ELEVATION													
END OF MONTH	0.00	0.00	0.00	0.00	0.00	0.00	504.75	510.15	510.98	510.88	512.02	511.41	
MAXIMUM	0.00	0.00	0.00	0.00	0.00	0.00	504.75	509.80	511.05	511.25	512.25	512.02	
MINIMUM	0.00	0.00	0.00	0.00	0.00	0.00	504.75	504.75	510.15	510.95	510.62	511.43	
POOL CONTENT EOM (1000 AC.FT.)	0	0	0	0	0	0	0	4	4	4	5	5	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
WACO LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1907 THRU 1982	25	16	20	18	24	26	47	70	31	14	8	17	316
FY 1983	0	3	3	4	21	22	4	6	5	1	0	0	69
RELEASES (1000 AC.FT.)													
AVG 1965 THRU 1982	9	14	13	16	20	29	36	75	30	16	3	5	266
FY 1983	0	0	0	0	0	17	1	0	0	0	0	0	16
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.58	2.19	2.53	2.26	2.39	2.09	3.83	4.33	2.68	2.14	1.67	3.00	32.36
FY 1983	1.82	3.67	2.29	1.54	2.14	3.42	0.41	5.23	2.09	1.69	2.46	0.35	27.68
DEVIATION	-0.76	1.48	-0.21	-0.72	-0.25	1.33	-3.42	0.37	-0.79	-0.45	0.79	-2.05	-4.68
POOL ELEVATION													
END OF MONTH	452.20	452.11	452.14	452.30	454.95	455.06	454.73	454.72	454.59	453.59	452.25	451.27	
MAXIMUM	452.66	452.36	452.18	452.30	454.95	456.27	455.15	454.73	455.11	454.59	453.41	452.25	
MINIMUM	452.20	451.93	452.09	452.11	452.26	454.80	454.73	454.43	454.58	453.41	452.25	451.27	
POOL CONTENT EOM (1000 AC.FT.)	129	129	129	130	149	150	147	147	146	139	130	123	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
PROCTOR LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1922 THRU 1982	3	2	1	3	2	5	5	12	5	2	1	3	44
FY 1983	1	1	1	1	1	4	1	4	3	0	0	0	17
RELEASES (1000 AC.FT.)													
AVG 1963 THRU 1982	3	3	2	3	6	4	9	11	9	8	4	2	64
FY 1983	1	0	1	0	0	0	0	0	1	2	4	2	11
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.71	1.66	1.76	1.65	1.69	1.55	3.06	4.68	2.75	2.08	1.65	2.73	27.97
FY 1983	1.46	2.73	1.80	1.49	0.92	3.91	0.68	3.60	2.65	0.61	1.20	0.90	22.00
DEVIATION	-1.25	1.12	0.04	-0.16	-0.77	2.36	-2.38	-1.08	-0.10	-1.47	-0.45	-1.83	-5.97
POOL ELEVATION													
END OF MONTH	1159.87	1159.82	1159.66	1159.60	1159.51	1160.02	1159.69	1160.00	1159.94	1159.70	1156.93	1155.58	
MAXIMUM	1160.34	1159.95	1159.85	1159.68	1159.60	1160.02	1160.05	1160.03	1160.35	1159.94	1158.70	1156.93	
MINIMUM	1159.87	1159.63	1159.61	1159.58	1159.51	1159.46	1159.69	1159.66	1159.89	1158.70	1156.93	1155.58	
POOL CONTENT EOM (1000 AC.FT.)	50	50	49	49	49	51	49	51	50	45	39	35	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
BELTON LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1938 THRU 1982	31	21	31	31	36	37	65	103	49	24	14	26	468
FY 1983	0	4	3	3	18	38	10	31	7	1	5	0	120
RELEASES (1000 AC.FT.)													
AVG 1954 THRU 1982	25	23	20	26	26	37	34	51	66	45	14	9	387
FY 1983	1	1	1	1	1	19	10	9	12	1	2	1	59
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.61	2.11	2.23	2.10	2.21	1.96	3.56	4.66	2.89	2.07	1.69	2.02	31.06
FY 1983	1.06	3.37	2.29	1.76	2.12	3.50	0.42	4.70	2.08	1.01	2.23	0.97	26.06
DEVIATION	-1.55	1.76	0.01	-0.34	-0.09	1.54	-3.14	0.04	-0.81	-1.06	0.59	-1.05	-5.00
POOL ELEVATION													
END OF MONTH	592.58	592.53	592.42	592.37	593.45	594.56	594.00	595.15	594.24	593.50	593.53	592.41	
MAXIMUM	593.13	592.80	592.58	592.46	593.45	594.69	594.53	595.90	595.15	594.24	593.54	593.13	
MINIMUM	592.58	592.41	592.39	592.31	592.35	593.45	593.98	593.90	594.24	593.50	593.13	592.41	
POOL CONTENT EOM (1000 AC.FT.)	424	424	423	422	435	449	442	456	445	436	431	423	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
STILLHOUSE HOLLOW LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1924 THRU 1982	14	10	12	15	22	23	26	46	21	10	5	11	215
FY 1983	0	2	1	2	12	28	9	38	11	2	2	0	107
RELEASES (1000 AC.FT.)													
AVG 1968 THRU 1982	8	7	9	13	13	16	21	35	25	23	3	6	179
FY 1983	0	0	0	0	2	25	7	30	13	1	1	0	79
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.78	2.16	2.33	2.02	2.13	1.84	3.35	4.42	2.99	1.98	1.92	3.11	31.03
FY 1983	1.09	4.25	2.29	1.59	2.31	3.82	0.30	5.[illegible]	2.75	1.26	2.06	0.77	26.28
DEVIATION	-1.69	2.09	-0.04	-0.43	0.18	1.98	-3.05	1.57	-0.24	-0.72	0.14	-2.34	-2.75
POOL ELEVATION													
END OF MONTH	620.43	620.60	620.63	620.84	622.17	622.36	622.14	622.99	622.28	621.77	621.43	620.87	
MAXIMUM	620.75	620.60	620.64	620.84	622.21	623.48	622.36	624.08	622.99	622.23	621.85	621.43	
MINIMUM	620.39	620.38	620.57	620.64	620.80	622.05	621.97	622.14	622.25	621.77	621.43	620.87	
POOL CONTENT EOM (1000 AC.FT.)	226	227	227	228	237	238	237	242	238	234	232	229	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
GEORGETOWN LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1980 THRU 1982	4	2	1	1	1	1	2	14	27	3	1	3	66
FY 1983	0	1	0	1	10	14	5	16	9	2	1	0	59
RELEASES (1000 AC.FT.)													
AVG 1980 THRU 1982	3	2	1	0	0	0	1	4	13	16	1	3	50
FY 1983	0	0	0	0	9	13	5	15	9	2	1	0	54
RAINFALL (INCHES)													
AVG 1931 THRU 1960	3.16	2.50	2.38	2.16	2.37	2.03	3.61	4.01	2.89	1.77	2.12	3.46	32.46
FY 1983	1.60	5.58	2.24	1.42	3.49	4.44	0.19	5.15	3.82	1.68	1.62	0.82	32.75
DEVIATION	-1.56	3.08	-0.14	-0.74	1.12	2.41	-3.42	2.14	0.93	-0.09	-0.50	-2.94	0.29
POOL ELEVATION													
END OF MONTH	789.58	789.79	789.78	790.55	791.50	791.45	791.35	792.17	791.44	791.53	791.04	790.42	
MAXIMUM	789.95	789.80	789.83	790.55	792.55	793.87	791.61	791.60	792.06	791.61	791.62	791.04	
MINIMUM	789.58	789.58	789.70	789.78	790.55	792.05	791.04	791.05	791.20	791.06	791.04	790.42	
POOL CONTENT EOM (1000 AC.FT.)	35	36	35	36	38	38	38	39	38	38	37	36	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
GRANGER LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1980 THRU 1982	10	8	4	4	5	7	9	24	63	22	4	19	179
FY 1983	1	2	3	4	16	37	13	51	26	6	6	2	167
RELEASES (1000 AC.FT.)													
AVG 1980 THRU 1982	9	8	2	2	2	1	5	13	35	45	4	18	144
FY 1983	0	0	0	3	16	37	11	49	20	7	4	1	148
RAINFALL (INCHES)													
AVG 1931 THRU 1960	3.16	2.50	2.38	2.16	2.37	2.03	3.61	4.01	2.89	1.77	2.12	3.46	32.46
FY 1983	2.17	4.85	2.22	1.59	3.42	4.65	0.18	6.07	3.14	1.76	3.09	1.64	34.78
DEVIATION	-0.99	2.35	-0.16	-0.57	1.05	2.62	-3.43	2.06	0.25	-0.01	0.97	-1.82	2.32
POOL ELEVATION													
END OF MONTH	503.35	503.74	504.17	504.35	504.33	504.02	504.07	503.98	504.37	504.12	504.12	504.00	
MAXIMUM	503.4[illegible]	503.74	504.17	504.35	504.72	505.47	504.43	504.18	504.17	504.37	504.78	504.15	
MINIMUM	503.31	503.33	503.74	504.17	504.14	503.98	503.95	503.98	503.98	504.12	504.08	504.00	
POOL CONTENT EOM (1000 AC.FT.)	63	64	66	67	67	66	66	65	69	66	66	66	

BRAZOS RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
SOMERVILLE LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1924 THRU 1982	13	14	17	22	23	19	29	38	22	12	3	10	222
FY 1983	4	2	8	13	54	73	0	72	5	2	11	5	259
RELEASES (1000 AC.FT.)													
AVG 1967 THRU 1982	11	12	14	9	17	15	22	33	33	21	5	5	198
FY 1983	0	0	0	3	36	34	51	16	49	0	2	2	193
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.66	3.10	3.15	2.39	2.37	2.44	3.71	3.95	3.43	2.35	2.45	3.09	36.09
FY 1983	4.24	3.73	2.71	2.30	4.10	5.46	0.20	7.29	3.31	2.15	4.54	3.11	43.64
DEVIATION	1.58	0.63	-0.44	-0.09	1.23	3.02	-3.51	3.34	-0.12	-0.20	2.09	0.02	7.55
POOL ELEVATION													
END OF MONTH	236.57	236.57	237.15	237.60	239.92	242.75	238.05	242.16	238.26	237.90	238.21	238.10	
MAXIMUM	236.66	236.60	237.15	237.72	240.68	242.33	242.75	242.95	242.16	238.26	238.41	238.30	
MINIMUM	236.38	236.45	236.57	237.15	238.56	238.12	238.02	237.90	238.26	237.89	237.75	237.83	
POOL CONTENT EOM (1000 AC.FT.)	144	144	150	167	183	220	161	212	163	159	153	161	

COLORADO RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TWIN BUTTES LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1963 THRU 1982	4	2	2	2	2	2	3	5	2	1	4	5	34
FY 1983	2	1	6	1	0	2	3	7	2	4	5	4	37
RELEASES (1000 AC.FT.)													
AVG 1963 THRU 1982	2	2	2	2	2	2	4	6	4	6	4	2	38
FY 1983	2	1	6	1	0	2	3	7	2	4	5	4	37
RAINFALL (INCHES)													
AVG 1931 THRU 1960	1.31	0.76	0.91	0.89	0.83	0.83	1.74	2.89	1.83	1.74	1.45	2.37	18.05
FY 1983	1.12	1.09	1.28	1.69	0.31	0.99	0.68	0.77	3.44	0.65	0.43	0.49	12.94
DEVIATION	-0.69	0.33	0.37	0.80	-0.52	0.16	-1.06	-2.12	1.61	-1.09	-1.02	-1.88	-5.11
POOL ELEVATION													
END OF MONTH	1920.77	1920.59	1919.96	1920.61	1920.37	1920.50	1919.31	1916.59	1917.08	1914.95	1912.31	1910.03	
MAXIMUM	1921.51	1920.77	1920.65	1920.60	1920.38	1920.92	1920.50	1919.33	1917.43	1917.09	1914.98	1912.33	
MINIMUM	1920.77	1920.57	1919.86	1919.86	1920.60	1920.50	1919.33	1916.61	1916.47	1914.98	1912.33	1910.05	
POOL CONTENT EOM (1000 AC.FT.)	0	0	0	0	0	0	0	0	0	0	0	0	

COLORADO RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
D.C.FISHER LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1915 THRU 1932	4	0	0	0	1	1	4	6	3	3	1	7	30
FY 1983	0	0	0	1	0	1	0	0	1	0	0	0	3
RELEASES (1000 AC.FT.)													
AVG 1953 THRU 1982	2	0	0	0	0	0	0	0	0	1	0	0	3
FY 1983	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINFALL (INCHES)													
AVG 1931 THRU 1960	1.33	0.75	1.04	0.84	0.84	0.85	1.59	2.71	1.91	2.09	1.65	2.18	18.34
FY 1983	0.52	1.05	1.29	2.18	0.22	0.84	0.25	1.19	2.56	1.02	0.34	0.34	11.30
DEVIATION	-1.36	0.30	0.25	1.34	-0.62	-0.02	-1.34	-1.52	0.65	-1.07	-1.31	-1.84	-6.54
POOL ELEVATION													
END OF MONTH	1833.67	1833.38	1833.30	1833.49	1833.45	1833.23	1832.86	1832.27	1832.28	1831.53	1830.86	1830.09	
MAXIMUM	1834.15	1833.67	1833.38	1833.49	1833.53	1833.43	1833.28	1832.86	1832.58	1832.23	1831.66	1830.88	
MINIMUM	1833.67	1833.33	1833.29	1833.30	1833.45	1833.23	1832.86	1832.27	1832.20	1831.58	1830.83	1830.09	
POOL CONTENT EOM (1000 AC.FT.)	31	30	30	31	31	30	29	28	28	27	25	24	

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COLORADO RIVER BASIN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
BORDS CREEK LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1942 THRU 1982	0	0	0	0	0	0	1	1	0	0	0	0	2
FY 1983	0	0	0	0	0	0	0	0	0	0	0	0	0
RELEASES (1000 AC.FT.)													
AVG 1953 THRU 1982	0	0	0	0	0	0	0	0	0	0	0	0	0
FY 1983	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.49	1.31	1.44	1.56	1.29	1.25	2.30	4.49	2.73	2.38	1.94	3.04	26.82
FY 1983	0.64	2.20	1.29	2.70	1.12	3.00	1.20	3.59	3.80	0.65	1.13	0.84	22.16
DEVIATION	-1.85	0.89	-0.15	1.14	-0.17	1.75	-1.70	-0.90	1.07	-1.73	-0.81	-2.20	-4.66
POOL ELEVATION													
END OF MONTH	1838.39	1838.11	1887.92	1837.90	1837.73	1837.63	1837.14	1836.60	1886.30	1885.37	1884.43	1883.77	
MAXIMUM	1889.00	1838.39	1888.13	1887.93	1837.92	1837.79	1837.63	1837.14	1836.63	1836.30	1885.37	1884.43	
MINIMUM	1888.39	1837.95	1887.90	1887.80	1887.73	1837.62	1887.14	1886.60	1886.21	1885.37	1884.43	1883.77	
POOL CONTENT EOM (1000 AC.FT.)	4	4	4	4	4	3	3	3	3	3	3	3	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
MARSHALL FORD													
INFLOWS (1000 AC.FT.)													
AVG 1941 THRU 1982	127	63	52	76	81	85	125	237	165	97	86	108	1302
FY 1983	3	24	12	17	39	76	27	168	94	26	31	52	569
RELEASES (1000 AC.FT.)													
AVG 1944 THRU 1982	69	55	50	48	55	59	93	175	173	130	118	80	1110
FY 1983	8	3	8	0	0	13	39	61	92	82	55	37	449
RAINFALL (INCHES)													
AVG 1931 THRU 1960	2.39	1.46	1.42	1.13	1.18	1.27	2.46	3.27	2.50	2.02	2.03	2.76	23.33
FY 1983	0.84	2.34	1.68	1.66	1.44	2.70	0.48	3.47	3.94	1.23	1.62	0.73	22.63
DEVIATION	-1.55	1.33	0.26	0.53	0.26	1.43	-1.98	0.20	1.44	-0.79	-0.41	-2.03	-1.26
POOL ELEVATION													
END OF MONTH	664.78	665.95	666.03	667.04	668.35	672.34	671.68	677.42	677.09	673.31	671.24	668.66	
MAXIMUM	665.43	665.35	665.96	667.04	668.35	672.34	673.05	677.76	678.63	677.14	673.32	671.24	
MINIMUM	664.78	664.75	665.77	666.03	667.01	669.35	671.68	671.00	677.07	673.31	671.24	668.52	
POOL CONTENT EOM (1000 AC.FT.)	895	913	914	930	967	1025	1005	1105	1099	1033	998	956	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
CANYON LAKE													
INFLOWS (1000 AC.FT.)													
AVG 1915 THRU 1982	31	16	17	20	21	23	31	40	30	22	18	27	296
FY 1983	5	10	10	10	12	23	13	21	25	12	6	5	152
RELEASES (1000 AC.FT.)													
AVG 1964 THRU 1982	17	17	12	14	18	19	21	26	30	22	27	17	240
FY 1983	5	5	5	10	14	17	24	10	15	16	1	4	126
RAINFALL (INCHES)													
AVG 1931 THRU 1960	3.05	1.67	2.18	2.07	2.20	2.00	3.00	4.03	2.98	2.40	2.07	4.02	31.67
FY 1983	1.31	4.35	1.93	1.22	2.34	3.69	0.16	3.59	4.64	2.11	2.36	2.45	30.15
DEVIATION	-1.74	2.68	-0.25	-0.85	0.14	1.69	-2.84	-0.44	1.66	-0.29	0.29	-1.57	-1.52
POOL ELEVATION													
END OF MONTH	905.86	906.28	906.75	906.70	906.33	906.77	905.03	905.96	906.34	905.83	904.86	904.57	
MAXIMUM	906.16	906.27	906.81	907.03	906.70	906.85	906.77	906.22	906.89	906.84	906.83	904.86	
MINIMUM	905.85	905.81	906.27	906.70	906.33	906.29	905.03	904.98	905.81	905.83	904.86	904.57	
POOL CONTENT EOM													
(1000 AC.FT.)	357	360	364	363	360	364	350	357	364	356	349	347	

PLATORO DAM[1]

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1983	3.7	1.2	1.0	.5	.0	.9	.9	9.8	37.6	22.1	5.5	1.2	72.6
Releases (1000 Ac-Ft)													
FY 1983	3.6	1.1	.0	.6	5.4	.6	1.0	9.8	35.9	22.0	7.1	1.0	89.1
Rainfall (Inches)	(DATA IS NOT AVAILABLE DURING THE WINTER MONTHS)												
FY 1983	2.27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.5	.75	4.26	1.78	
Pool Elevation (EOM)	9982.30	9982.60	9982.40	9982.30	9971.70	9972.20	9972.10	9972.10	9975.50	9975.40	9972.30	9972.5	
Maximum	9982.90	9982.60	9982.40	9982.40	9981.30	9972.30	9972.10	9972.10	9976.40	9975.50	9975.60	9972.5	9982.90
Minimum	9982.20	9982.20	9982.30	9982.30	9971.70	9971.80	9971.80	9971.90	9971.70	9975.00	9972.30	9972.3	9971.70
Pool Content (EOM) (1000 Ac-Ft)	19.6	19.8	19.7	19.6	14.1	14.3	14.3	14.3	16.0	15.9	14.3	14.4	

[1] Data for compiling averages unavailable

ABIQUIU DAM

Inflows (1000 Ac-Ft)													
Avg 1962 thru 1983	9.3	14.4	20.2	6.5	6.5	15.4	46.3	95.8	51.9	22.6	22.5	15.2	328.2
FY 1983	10.8	9.5	63.0	6.5	8.1	26.9	64.9	169.3	146.8	31.4	21.2	26.8	585.2
Releases (1000 Ac-Ft)													
Avg 1963 thru 1983	10.2	23.4	22.9	8.4	6.0	14.4	37.2	63.9	56.7	33.6	22.7	14.8	314.1
FY 1983	10.5	9.4	12.8	5.8	8.8	26.3	58.9	126.7	105.1	85.9	20.2	26.3	496.7
Rainfall (Inches)													
Avg 1957 thru 1983	.86	.55	.35	.34	.26	.52	.47	.74	.62	1.65	1.93	1.14	9.51
FY 1983	.50	.61	.48	.45	.09	.39	.17	.79	.93	1.01	2.01	.84	8.27
Pool Elevation (EOM)	6159.24	6159.10	6184.77	6184.92	6184.42	6184.32	6186.37	6200.55	6211.54	6193.90	6193.78	6193.49	
Maximum	6159.47	6159.36	6185.03	6184.92	6185.12	6184.67	6186.37	6200.55	6213.89	6211.05	6194.24	6193.78	6213.89
Minimum	6159.06	6159.02	6159.08	6184.60	6184.42	6184.20	6184.05	6184.90	6201.98	6193.90	6193.78	6193.49	6159.02
Pool Content (EOM) (1000 Ac-Ft)	32.3	32.1	82.0	82.4	81.1	80.9	80.6	127.2	166.5	106.2	105.8	105.1	

COCHITI LAKE

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1910 thru 1983	48.4	52.5	48.0	123.2	247.5	185.3	89.4	76.1	200.9	84.8	55.2	43.5	1254.8
FY 1983	63.2	57.8	53.6	46.3	52.9	90.9	148.0	314.3	384.1	195.2	56.3	40.1	1502.7
Releases (1000 Ac-Ft)													
Avg 1975 thru 1983	33.9	50.9	52.5	39.8	38.6	62.0	103.0	215.3	214.0	192.0	52.1	43.7	1097.8
FY 1983	63.0	57.4	52.8	46.1	52.8	90.2	140.7	300.2	396.0	198.0	55.5	39.7	1492.4
Rainfall (Inches)													
Avg 1957 thru 1983	.90	.65	.56	.58	.36	.54	.46	.94	.74	1.85	2.34	1.49	11.41
FY 1983	.76	1.48	1.21	.61	1.00	.67	.09	.84	.78	1.73	2.60	1.03	12.80
Pool Elevation	5322.70	5322.83	5323.49	5323.46	5323.31	5323.51	5329.31	5339.04	5329.53	5326.59	5326.64	5326.40	
Maximum	5322.91	5322.97	5323.60	5323.71	5323.52	5323.72	5329.31	5339.04	5348.68	5329.23	5327.45	5326.93	5348.68
Minimum	5322.37	5322.55	5322.55	5323.45	5323.28	5323.07	5323.75	5323.78	5329.03	5324.64	5326.41	5326.37	5322.37
Pool Content (EOM) (1000 Ac-Ft)	41.8	42.0	42.7	42.6	42.5	42.7	49.4	62.8	49.7	46.2	46.2	46.0	

GALISTEO DAM

Inflows (1000 Ac-Ft)													
Avg 1971 thru 1983													
FY 1983					INFLOW = OUTFLOW								
Releases (1000 Ac-Ft)													
Avg 1971 thru 1983	.44	.07	.07	.08	.10	.12	.18	.20	.21	1.52	1.13	.87	4.99
FY 1983	.04	.09	.06	.02	.05	.17	.17	.06	0	.51	.52	.34	2.03
Rainfall (Inches)													
Avg 1971 thru 1983	.76	.56	.26	.39	.42	.41	.47	.93	.32	.72	1.74	1.21	8.94
FY 1983	.80	1.61	.77	.53	.83	1.03	.12	.15	1.07	1.31	1.41	.97	10.34
Pool Elevation (EOM)													
Maximum					NO END OF MONTH STORAGE DURING THE YEAR								
Minimum													
Pool Content (EOM) (1000 Ac-Ft)	0	0	0	0	0	0	0	0	0	0	0	0	0

JEMEZ CANYON DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1953 thru 1983	1.8	1.8	1.4	1.6	1.7	3.6	13.0	11.4	2.7	1.1	3.1	1.1	44.0
FY 1983	1.0	2.3	2.0	2.3	2.6	7.0	32.6	39.0	13.9	1.1	3.8	.7	108.2
Releases (1000 Ac-Ft)													
Avg 1954 thru 1983	1.6	1.8	1.7	1.5	2.4	3.4	10.1	12.5	5.9	1.3	2.9	1.1	46.1
FY 1983	.7	2.2	2.1	1.6	3.0	6.9	27.4	39.7	16.9	.8	3.6	.4	105.4
Rainfall (Inches)													
Avg 1953 thru 1983	.92	.43	.40	.39	.36	.37	.33	.75	.46	1.30	1.55	1.10	8.39
FY 1983	.40	.90	.53	.48	.49	.53	.04	.42	1.34	1.59	.61	.84	8.17
Pool Elevation (EOM)	5160.54	5160.42	5159.55	5161.71	5160.26	5160.11	5171.27	5169.54	5161.98	5162.00	5161.92	5161.92	
Maximum	5160.54	5160.83	5160.52	5161.71	5162.35	5161.89	5172.60	5170.77	5170.09	5162.28	5164.86	5162.36	5172.60
Minimum	5159.73	5159.45	5159.55	5159.51	5159.86	5159.36	5160.84	5164.63	5154.54	5161.10	5161.16	5161.28	5154.54
Pool Content (EOM) (1000 Ac-Ft)	2.1	2.1	1.9	2.6	2.1	2.0	7.0	5.9	2.6	2.6	2.6	2.6	

SANTA ROSA

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
Avg 1981 thru 1983	2.0	.9	.9	1.0	.9	1.9	4.8	13.2	15.4	9.1	23.2	7.6	80.6
FY 1983	2.5	1.2	1.3	1.5	1.4	3.8	12.4	31.1	32.9	7.4	5.7	2.1	103.3
Releases (1000 Ac-Ft)													
Avg 1981 thru 1983	.4	.4	.4	.3	.2	.2	.2	3.9	13.5	24.4	9.8	14.9	68.5
FY 1983	.06	.07	.08	.07	.07	.07	.05	8.0	25.1	36.3	19.0	16.6	105.4
Rainfall (Inches)													
Avg 1981 thru 1983	1.02	.55	.35	.61	.39	.47	.27	.63	1.19	2.16	4.80	1.14	13.59
FY 1983	1.79	.61	1.05	1.40	.84	.55	.35	.52	1.17	1.99	2.08	.68	13.03
Pool Elevation (EOM)	4718.15	4718.54	4719.05	4719.68	4720.14	4721.70	4727.19	4733.84	4735.87	4723.10	4714.12	4655.62	
Maximum	4718.15	4718.54	4719.05	4719.68	4720.14	4721.70	4727.19	4733.84	4738.43	4735.22	4724.95	4712.93	4738.43
Minimum	4717.20	4718.16	4718.58	4719.06	4719.70	4720.20	4721.84	4725.96	4734.67	4722.22	4714.12	4695.62	4695.62
Pool Content (EOM) (1000 Ac-Ft)	31.7	32.3	33.1	34.2	35.0	37.9	49.2	65.9	71.7	40.6	25.7	8.7	

TWO RIVERS DAM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Inflows (1000 Ac-Ft)													
FY 1964 thru 1983	.5	.5	.3	.3	.2	.02	.5	.6	.6	.5	1.0	1.6	6.6
FY 1983	0	0	0	0	0	0	1.3	2.0	.3	0	0	.03	3.6
Releases (1000 Ac-Ft)*													
Avg 1964 thru 1983													
FY 1983													
Rainfall (Inches)													
Avg 1964 thru 1983	1.01	.26	.17	.21	.37	.26	.38	.72	1.34	1.99	2.85	2.22	11.70
FY 1983	2.55	.06	.04	.19	.18	.06	.27	.69	.55	.80	.87	.98	7.24
Pool Elevation (EOM)**	NO END OF MONTH STORAGE DURING YEAR												
Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
Pool Content (EOM) (1000 Ac-Ft)	0	0	0	0	0	0	0	0	0	0	0	0	

* INFLOW - OUTFLOW
** INVERT ELEVATION

SUMNER LAKE Data unavailable.

MINUTES
Thirteenth Annual Meeting
Trinity River Water Management Interests Group
28 June 1983

1. The Thirteenth annual meeting of the Trinity River Water Management Interests Group was hosted by The Trinity River Authority at their general office in Arlington Texas. The meeting was attended by thirty-one persons representing twenty organizations. A list of attendees and an agenda are inclosed.

2. Mr. Terry Coomes, Chief of the Water Management Branch, Southwestern Division Corps of Engineers opened the meeting, welcoming the attendees and thanking the attendees for their response to our request for topics and speakers. The meeting this year has been arranged to end at noon allowing those interested to attend the Texas Department of Water Resources "Texas Water Plan" public meeting later that day. He thanked The Trinity River Authority (TRA) for hosting the meeting and introduced Mr. Sam Scott, Executive Service Manager for the TRA.

3. Mr. Sam Scott welcomed the group on behalf of Mr. Dan Vance, General Manager, and the TRA. He stated it was a pleasure to host this meeting and hoped they can host future meetings.

4. The chairman, Mr. Coomes, asked those present to introduce themselves. He then reviewed some highlights of the previous meeting noting that the outlook for several projects, Richland Creek, Wallisville and Cooper looked better than they had in past years. Other items were mentioned to help members track the progress of those activities.

5. Mr. David Morris, Chief of the National Weather Service River Forecast Center at Fort Worth spoke on the Standard Hydrologic Exchange Format (SHEF). SHEF was developed as a prerequisite for automated data exchange and has been adopted by the National Weather Service as the standard format for encoding hydrologic data. The format is sufficiently flexable to handle most hydrometerological data and is being adopted by the C of E, USGS, Soil Conservation Service and other agencies. SHEF has been designed to provide automated data handling while maintaining a format that is visibly readable. Some of the more significant features of SHEF formats are the three basic message formats: "dot A", representing single station, multiple parameter; "dot B", a multiple station, multiple parameter header; and "dot E", single station, single parameter evenly spaced time series. The code had to be visually readable, provide internal identification for a data base, completely identify hydrologic data collected at nonstandard reporting times and at nonstandard locations, and allow a minimum number of characters to identify most routine hydrologic parameters. Over 100 parameter codes have been identified at this time. SHEF has been used in the Pacific Northwest for several years by the NWS, Corps of Engineers and Bonneville Power Authority. As with all standardized formats it requires rigid compliance with a set of rules thus removing the "originality" from individual messages. "Data Call" software has been developed

in conjunction with SHEF to automatically call remote gages, read the data, transform it into SHEF format and post it to the data base. SHEF coders have been developed for the IBM 6195 and the Data General S140 systems. A coder for the Corps' Harris computers should be available shortly. Examples of messages under the old and SHEF formats were shown and explained. The SHEF is being used for AFOS communications now but has not been incorporated into normal teletype communications yet.

6. Mr. Warren Brewer, Regional Manager, TRA Northern Region, spoke on the Revenue and Energy Production Program for the TRA Central Regional Wastewater System. The plant was built in the 1960's to serve part or all of the cities of Dallas, Grand Prairie, Farmers Branch and Irving. It has been expanded from 30 mgd to 100 mgd and now provides treatment for parts of 16 cities. TRA began looking at energy alternatives in 1981 and invited energy audits by Texas A & M Extension Service and a consultant in 1982. The reports concluded that they could find no way to achieve a reduction in usage or cutting energy costs. Both indicated they would use some of the energy conservation methods already in practice at the plant in presentations to others in governmental and private organizations. They have continued looking for energy savings methods and are developing two potential energy sources: a small hydroelectric power unit at the plant outfall and methane gas production and utilization. The hydroelectric power plant will be a 300 killowatt plant costing about $600,000 and producing approximately 6-8% of the total plant electrical needs. The plant's digesters were converted in the 1970's to an aerobic digestion process. They will be modified again to provide for anaerobic digestion. The methane gas produced will be used to power air pumps for other treatment processes. Part of the $18.2 million bond issue of April 1983 will be used to construct the hydroelectric power plant, retrofit the digesters, and construct a pipeline and pump station to deliver secondary treated water to Los Colinas for lake control and irrigation purposes. Projections are for $80,000 savings in 1985 increasing to $800,000 in 2000. Debt service will end in 2010 with savings in 2011 projected to be $2.6 million. Methane production has the best benefit cost ratio of the sources. Another energy source investigated was sludge inceneration for electrical generation. This source is not cost effective at this time. The two energy production methods will provide 15% to 16% of TRA's Central Regional Wastewater Treatment Plant energy needs thus reducing costs to their customers.

7. Mr. Lynn Harmsen of the United States Geological Survey, Fort Worth spoke Urban Hydrology Programs in the Dallas-Fort Worth Metropolitan Area. Mr. Harmsen reviewed a report completed by USGS in cooperation with the Texas Department of Water Resources, the cities of Dallas, Fort Worth, Garland and Mesquite; Dallas County and the Corps of Engineers on the magnitude and frequency of flood peak discharges at ungaged sites in the area. The approach taken involved the following steps. Collect and compile a hydrologic data base representing a variety of basic characteristics including the degree of urban development. Calibrate a rainfall-runoff model for each stream then extend the recorded data using the model and historic climatic data. Develop flood-frequency relations for each stream using the above data and log-Pearson Type III analytical procedures. Weight the discharge frequency relations to develop

T-year discharges for the basins. Use multiple-regression analysis to develop mathematical equations for estimating flood magnitude for selected frequencies. Assess the the mathematical expressions to describe relative effects of urban development on flood discharge.

Data was collected for 36 basins over 20 storm periods but sufficient data for analysis was collected at only 21 basins. The Love Field NWS station was used for long term hydrologic data. Basin characteristics in addition to physical characteristics such as drainage area, channel slopes and lengths included an Urbanization Index based on storm sewers, curbs and gutters and channel rectifications. A rainfall-runoff model was developed by USGS based on bulk-parameter approximations of the physical laws that govern antecedent soil moisture, infiltration, and runoff. The model was designed specifically for the simulation of flood hydrographs for small drainage areas. The resulting equations provided reasonable means of determining flood peak frequencies for small water sheds in the Dallas-Fort Worth area. USGS has proposed to the City of Dallas the study of 8 small basins of 10 acres to 1/2 square mile which would extend the range of data from the previous study. This study would also include some water quality parameters.

8. Mr. John Promise, Director of Enviornmental Resources, North Central Texas Council of Governments presented information on a recently completed comprehensive pilot stormwater study of Rush Creek. The study was conducted in cooperation with the City of Arlington. The study focused on three major issues: 1) an understanding of the local government realities which affect stormwater management; 2) the identification and documentation of runoff-related problems; and 3) the application of workable management policies and practices. Because of its generally representative nature, Rush Creek in Tarrant County was chosen for this effort. Through consultation with the City of Arlington staff, the problems in Rush Creek were grouped into the following six categories from highest to lowest priority: flooding, erosion, nutrients, periodic pollutants, mosquitos and oxygen demanding pollutants. Five different methods, ranging from review of sampling data to a photographic expedition, were used to document the problems in Rush Creek. Next, a variety of individual stormwater management techniques were identified by the professional consultants and city staff, including: stormwater management basins; onsite storage; fertilizer management; sweeping of impervious surfaces; natural drainage systems; development planning such as performance zoning; and temporary erosion controls. Information concerning the costs, pollutant removals, and design considerations were developed for each technique. The techniques were then grouped within the six problem categories.

The final portion of the study focused on the local approaches to watershed management. Cities in North Central Texas generally manage watersheds on one of three levels: corrective-only actions, corrective as well as preventive actions, and the use of master watershed plans. The City of Arlington utilizes a corrective/preventive method of management with responsibilities dispersed among several city departments. A description of the City's current practices and suggested modifications to improve this particular management approach were presented. The next logical step for increased management capabilities by

Arlington is master watershed planning. This can be performed on two levels of detail; general planning and detailed planning. An explanation of both levels of master watershed planning and the steps necessary to adapt these concepts to Arlington was presented.

The Planning & Zoning Commission and the City Council of Arlington have been briefed on the pilot study and final report. Specific actions are being proposed by the staff for implementation.

9. Mr. Clarence Warnstaff, Deputy Director of Planning, Dallas Water Utilities spoke on Dallas Long Range Water Use. Long range planning is a dynamic process, one that never ends. In 1975, Forrest and Cotton produced a study of Dallas long range water needs through the year 2050. The study was updated in 1977 when Dallas was considering construction of Ray Roberts Reservoir. The projections were updated again in 1980, looking at the growth of the planning area. In 1982, it was recognized that the plan needed updating. Results of the 1980 census and the NCTCOG population projections were in. An analysis of water use per capita and population projections for cities served presently and anticipated new cities to be served were used in the study. Dallas' water use is expected to level off in the next 30 years simply because there will be no land area to grow into. The customer cities usage will however continue to grow. Per capita usage is the hardest variable to determine in studies of this type. Consumption growth from 1916 to 1982 was computed to be about 2.3 gallons per capita per day per year. The growth from 1962 to 1982 however has been 4.6 gallons per capita per day or double the long term growth rates. It is unreasonable to assume that this growth rate will continue but just when the consumptive growth rate will go down and by how much is a matter of judgement. The information from the customer cities was not as complete as Dallas' but consumptive use per capita is expected to be only about 80% of Dallas. Projections of total water use in mgd and available raw water sources were shown through 2030. New sources include Ray Robert Reservoir, Lakefork Reservoir and Lake Palestine. Additional sources may be necessary between 2020 and 2030.

10. Mr. Allen White, of the Texas Department of Water Resources, presented a discussion of the Texas Water Plan. The 1983 Texas Water Plan has been prepared for purposes of revising and amending the Texas Water Plan which was adopted by the Texas Water Development Board in 1968. As a part of the planning work, the Texas Department of Water Resources, the Texas Energy and Natural Resources Advisory Council (TENRAC), and the Governors Task Force on Water Resources Use and Conservation conducted a broad-based public participation program in early 1982 to obtain public input. This input was obtained through public meetings, personal interviews and comments, and public opinion surveys. Task Force members and others were organized into three working committees to consider water planning issues including financing, management, conservation, quality protection, research and education. The result was a recommendation that the 1968 Texas Water Plan be revised. In the planning report, information is presented about Texas water resources and future water quality protection, water conservation, water supply, flood protection and water-related needs. Potential projects and associated cost estimates for water supply, water quality control, flood control and other water related needs are presented. Water quality pro-

tection, water conservation, municipal and industrial water supply development, and water for enviornmental needs are emphasized. Agricultural water supply needs and water conservation methods are also addressed. Projections for the future are based upon water, demographic, economic, and technical data of the recent past. The planning information and the plans, projects and alternatives identified are of necessity based on existing water and enviornmental law and existing institutional arrangements affecting water resources, water use, and waste water management. The Texas Water Plan is a flexible guide for use by state and local governments and the private sector to solve their respective water problems. After a period of review and public hearings, the draft planning report will be revised in light of public comments and recommendations then submitted to the Texas Water Development Board for adoption as the official water plan for Texas.

11. A report on Corps of Engineers activities in the Trinity River Basin was presented by Mr. Arnold Escobar, Chief of the Reservoir Control Section, Fort Worth District and Mr. Martin Howland, Wallisville Project Engineer, Galveston District.

a. Mr. Escobar reviewed Corps activities in the upper basin.

1. The Design Memorandum for the Grapevine Lake spillway modification project has been approved. A concrete chute will be constructed beginning at the end of the existing spillway apron (elev 545 n.g.v.d) and ending in a new stilling basin at elevation 462. The chute will be 500 feet wide and 301 feet long. Plans and specifications will be completed soon and the project advertised on 1 August. The contract should be awarded before 1 October 1984.

2. Construction on Joe Pool Lake, formerly Lakeview Lake is progressing. The outlet works and initial embankments were completed in June 1982. Some relocation work has been completed but many of the streets and roads relocations remain. The embankment, spillway and remaining portions of the outlet works are scheduled for December 1985. To date, 22 of the 26 design memorandums have been completed and 14,791 acres or about 82% of the total has been acquired.

3. The embankment, spillway and outlet works contract is underway at Ray Roberts Lake. Twenty of the 32 design memorandums are completed. The outlet works has been redesigned to accomodate a small hydroelectric power generation unit. Deliberate impoundment is scheduled for September 1986 and project completion in fiscal year 1988. To date, land acquisition is 25% complete with about 12,033 acres acquired.

4. There is a Section 14 emergency stream bank erosion project proposed at the Grand Prairie city landfill. The project consists of an excavated 700 foot cut-off channel and restoration of 600 linear feet of levee. Two low flow conduits will be installed in the closure structure for enviornmental purposes. Construction is tentatively scheduled to begin in October 1983. Construction funds have not been obtained.

5. Another Section 14 emergency project is proposed at Meyers Road in Grand Prairie. Stream banks in the area have eroded to the point that the road is endangered. The project calls for installation of about 500 linear feet of revetment matress and restoration of the eroded bank. Total cost of the project is estimated to be about $285,000. Construction funds have not yet been obtained. Construction is tentatively scheduled for FY 84.

6. Fort Worth District has received approval to obtain and operate a ground receive station for hydro-meterologic data. Data from 300 platforms operating in a 4 state area will be received initially. The number of platforms will eventually increase to more than 500. Data collected by the station will be distributed to the SWD office and the other SWD districts through the WCDS computer network. Currently there are 38 active platforms located within the Trinity River Basin.

7. A test network of 14 reporting rainfall gages will be instituted in the upper Trinity River basin above Grapevine, Lewisville and Lavon Lakes. The gages will be located at existing Corps, USGS or NWS gage sites to provide complete coverage over the watersheds. Platforms will be equipped with Handar tipping bucket rain gages and satellite communications equipment. Transmission will be self-timed with random capability when certain threshold amounts are reached. Installation is expected in 3-4 months depending on when channel assignments are received from NESS. If the test program is successful the real-time network will be expanded basin wide.

8. FERC license applications for Lewisville and Ray Roberts Lakes have been reviewed by the district and comments furnished to SWD.

9. Water Control activities. During the past year 5 of the 6 Trinity River basin projects used part of their flood control storage. None of the floods required emergency releases above normal flood control release levels. Damages prevented during FY 82 total about $413,000,000.

10. Water quality monitoring activities last year included chemical and biological sampling at two sites each near Joe Pool Lake and Ray Roberts Lake. The monitoring is in relation to construction activities at each site.

b. Mr. Howland reviewed Galveston District activities in the lower Trinity basin. Plans for the Wallisville project have been revised to include a much smaller lake confined mainly to the left bank area. Much of the embankment across the estuary to the west of the lock will be abandoned. The report on the revised project is still being reviewed at higher headquarters. There is a bill in the Senate to approve the report.

12. Mr. Coomes invited all attendees to make any comments they feel pertinent.

a. Mr. Harry Hall, Federal Energy Regulatory Commission. FERC license applications for Lewisville and Ray Robert Lakes have been reviewed and comments forwarded to FERC Washington D.C. A preliminary permit application was received for Lake Livingston.

b. Mr. Larry Champagne, North Central Texas Council of Governments (NCTCOG). NCTOG has completed a Surface Water Quality Monitoring Programs Survey showing who collects data, what data they collect, where its collected and when they collect it for the NCTCOG area.

c. Mr. Chuck Wayland, Tarrant County Water Control and Improvement District No. 1. The main construction contract on the Richland Creek project has been awarded. The ground breaking ceremony was held last October. Land acquisition is 80-90% complete.

d. Sam Scott, TRA. TRA is completing work on their FERC License Application for a hydroelectric power plant at Lake Livingston. They are looking at a water supply project in the upper basin in cooperation with the US Bureau of Reclamation. They do not know at this time what local support will be required. Bureau of Reclamation policies are not firm at this point.

13. Adjourn.

Thirteenth Annual Meeting
Trinity River Basin Water Management Interests
Attendees

Darrell Jones	Texas Power & Light
Rob Bennett	Texas Electric Service Co.
David Brown	Corps of Engineers
Lynn Harmsen	U.S.G.S. Ft. Worth
Lee C. Bradley, Jr.	Ft. Worth Water Dept.
Harry T. Hall	FERC
Sam Lyle	Ft. Worth Water Dept.
Larry Champagne	NCTCOG
Steve Gudbjartsson	D. P. & L.
Don Maddox	D. P. & L.
Chuck Whaylen	TCWC & Imprv. Dist. No.1
Russ Bowen	EPA Reg. 6
Sam Brush	NCTCOG
David Stephens	NTMWD
John Jadrosich	TRA
Arnold Escobar	Corps of Engineers, Ft. Worth
John Promise	NCTCOG
Richard Browning	TRA
Robert Manning	NWS- Co-op Program
Charles Bresett	City of Carrollton
Frances Pelley	Texoma Regional Planning
Allen White	Texas Dept. of Water Resources
Martin Howland	Galveston Dist. Corps of Engineers
Joe Shewski	Dallas Water Utilities
Clarence Warnstaff	Dallas Water Utilities
Warren N. Brewer	Trinity River Authorities
Sam Scott	Trinity River Authorities
Marsh Rice	Trinity Improvement Asso.
Terry Coomes	Corps of Engineers, Dallas
Charles Sullivan	Corps of Engineers, Dallas
David Morris	NWS River Forecast Ctr, Ft. Worth

AGENDA

Thirteenth Annual Meeting
Trinity River Basin Water Management Interests

Date: 28 June 1983
Time: 8:30 a.m. until noon
Place: Trinity River Authority General Office, 5300 Collins, Arlington, Texas

	Topic
I.	Introduction - Mr. Terry Coomes, Corps of Engineers, SWD
II.	Welcome - Mr. Sam Scott, Trinity River Authority
III.	Minutes and Comments on 1982 Meeting - Mr. Terry Coomes, Corps of Engineers, SWD
IV.	Standard Hydrologic Exchange Format (SHEF) - Dr. David Morris, National Weather Service, Fort Worth
V.	Central Regional Wastewater System Revenue and Energy Production Program - Mr. Warren N. Brewer, Trinity River Authority, Regional Manager, Northern Region
VII.	Pilot Stormwater Study of Rush Creek - Mr. John Promise, North Central Texas Council of Governments
VIII.	Dallas Long Range Water Use Projections - Mr. Clarence Warnstaff, Dallas Water Utilities Department
IX.	Texas Water Plan - Mr. Allen White, Texas Department of Water Resources
X.	Status of Corps of Engineers Trinity River Basin Projects - Galveston and Fort Worth Districts
XI.	Comments and General Discussion - Municipalities, Water Districts, State Agencies, Private Organizations and Federal Agencies
XII.	Adjourn

MINUTES
1983 ANNUAL MEETING
RESERVOIR CONTROL CENTER
SOUTHWESTERN DIVISION
CORPS OF ENGINEERS
2 November 1983

1. Introduction. The 1983 Annual Reservoir Control Center (RCC) Meeting was held on 2 November 1983 in the Southwestern Division (SWD) Office, Dallas, Texas. Mr. Charles Sullivan, Chief of the RCC, made introductions and summarized agenda items. Colonel John H. Atkinson, SWD Executive Office, was in attendance and gave the group an explanation of his role in SWD Water Management Activities. The agenda and attendance list are inclosed as attachments 1 and 2, respectively.

2. Restructure of SWDO Water Management Branch. Mr. Terry Coomes, Chief, Water Management Branch, discussed the realignment of the branch. The realignment brought the hydraulics functions to the branch which have previously been the repsonsibility of the Technical Engineering Branch. The realignment also required shifting other functions, i.e., the establishment of the Hydrologic Modeling Center in the Tulsa District.

3. District Status Reports.

a. Little Rock District. Mr. James Proctor presented the activities of the district for the past year. Overall the district had an average year with the exception of the December 1982 and July 1983 flood events. The December rains produced many stages at the 100-year frequency level and others at record stages in the Arkansas and White River Basins. This event has been the greatest flood since Corps flood control structures were installed. Although large flood damages did occur, Corps structures saved many dollars in damage. Navagation was severely hampered due to loose barges (38) with some sinking and shoaling which required large quantities to be dredged. Dam 2 was severely damaged during the flood. Presently remedial repair is underway. Special operations (hinged pools) of the locks and dams were done to assist in removal of shoals along the navigation channel. The district recommended that such operations be used in future large flood events. Also, felt that additional coordination of the operation with dock owners, concessionaries etc. along the navigation system would make the operation more receptive to the public. During past flood operations, the district has received complaints on the present navigation warning system; therefore, the district is installing a new system. Mr. Proctor also discussed the 1) memorandum of understanding with the U. S. Geological survey (see Agenda Item No. VII), 2) special studies at Blue Mountain Lake which included hydrological model studies, 3) studies by the Waterways Experiment Station (WES) to investigate shoaling problems on the lower Arkansas River, 4) nonfederal hydropower development at Corps projects within the district, 5) installation of DCP's, presently 92 platforms have been installed and expect to install an additional 32 in the upcoming year, and 6) the newly acquired flow velosity meter. The district has installed an Acoustic Flow Meter in an attempt to minimize the impacts of backwater effects and varying flow rates on the

measurements of flows on the Arkansas River near Dardenelle. The meter uses sound waves and measures velocities direct by measuring the time of travel for sound waves transmitted back and fourth across the channel. The meter comes equipped with a computer which can be set to measure flows at specified times and will interface with WCDS data collection platforms. The cost of the equipment is $37,000 and the USGS will install it for $30,000, which makes a total cost of about $67,000. If the use of this equipment proves to be successful, then the district plans to install an additional meter on the lower Arkansas River. The equipment has been purchased and it is anticipated that its installation will take place in January 1984.

b. Fort Worth District. Mr. Arnoldo Escobar stated that the district did not experience any significant flood events during the past year. However, there was a lowering of the B. A. Steinhagen Pool by 28 feet over a one week-end period. This caused many inquiries from local people within the area. B. A. Steinhagen is a reregulating project, very little storage capacity, for power releases from Sam Rayburn Reservoir which is immediately upstream. The pool was immediately refilled without causing any enviormental damages. The district has devised an interim plan of regulation which is to minimize the risk of such a drawdown to reoccur. An interim plan of regulation for Grapevine Lake was also completed. The plan will be used until repairs can be made downstream of the emergency uncontrolled spillaway. Severe erosion occurred during the passage of flood flows resulting from the storm of October-November 1981.

c. Galveston District. Reported by Mr. Jim Kosclski. Had a calm year until hurricane Alicia made her landfall in August. The district lost all communications with the Addicks and Barker Projects. Fortunately rainfall resulting from Alicia in the basins above the projects was not intense; therefore, only about 10 percent of their flood storage was utliized. However, about a 1/3 of the district total rainfall occurred during this period. Currently the district is investigating the feasibility of adding water supply in both Addicks and Barker Reservoirs. Recreation activities are rapidly increasing around Addicks, i.e., a proposed zoo in the reservoir area. Mr. Kosclski stated that they are anticipating problems with proposed developments.

d. Albuquerque District. Mr. Dick Kreiner led the discussion for Albuquerque. The district experienced record snow packs over the past year. However, there were no special flood control operations required for the district's reservoirs. The Corps projects prevented large flood damages due their capability for storing runoff from snow melt and subsequent releases at channel capacities. The high sustained flows below Abiquiu have caused degradation of the downstream channel; thereby, increasing the regulating channel capacity by 1,000 C.F.S. Mr. Boyd Lare further stated that they have had complaints from Compact Commissions concerning the lack of sediment resurveys of the reservoirs. The Commissions were concerned that the sedimentation occurring in the lakes had depleted water supply storage. The district still has problems with the last resurvey of Jemez Canyon Reservoir and feels that the reservoir should be resurveyed. In the past, the Compact Commissions have not participated in the funding of the surveys and the district has not been successful in obtaining funds for surveys through the Corps budgeting process due to the low order of package

ranking. As a solution for obtaining funds for surveys, Mr. Lare suggested that a higher priority be given to ranking survey funding packages at higher levels.

e. Tulsa District. Mr. Ross Copley reported that past year flood activities were routine except for operations to assist navigation on the lower Arkansas River. The reservoir projects experienced only minor rises into their flood pools except for Markham Ferry. Records inflows were recorded at that project. Copan Lake located on the Little Caney or Arkansas River began deliberate inpoundment during the past year and immediately filled. The Copan Project prevented the highest flood damages of all projects within the district. The district encountered problems with low flow releases from projects in the State of Kansas. Other items discusses were the retirement of the Tulsa District Chief of Stream Gaging Section, the decline in navigation, about 60 percent, and the progress that the district had made towards the completion of the Water Control Data System (WCDS). Mr. Carroll Scoggins reported on downstream water rights (low flow releases). The District has not experienced any problems within the State of Oklahoma, releases are only made upon request from the Oklahoma Water Resources Board. Presently the district has an agreement with the State of Kansas to release natural flows from John Redmond, located on the Grand River, and the arrangements in the agreement have been successful. However, the district has encountered problems when low flow releases are made from the Verdigris River System (Toronto, Fall River and Elk City Lakes). When releases of 25 CFS were being made, the district had complaints from the state indicating that they were only receiving about 10 CFS. The projects' authorizing documents are very "hazy" on the issue of downstream water rights. In the absence of a reason for instream flow loss and the lack of a clear-cut authority on low flow releases, the district informed the downstream users that low flow releases would be discontinued. The district decision to discontinue such releases raised congressional inquiries. This issue is currently being evaluated by both the Corps and the State of Kansas. The State is currently evaluating stream standards which may permit project releases for water quality, irrigation, and M & I uses by the using cities. OCE is also evaluating the issue so that a legal opinion may be rendered.

4. Structure of the WCDS Software Development. Mr. Charles Sullivan discussed the on-going activities of software development for the WCDS and defined the structure of the various committes as outlined below.

a. Steering Committee
-Chairman: Chief, SWD Water Management Branch
-Members: Chiefs, District H & H Branches

b. Users Group Committee
-Chairman: Chief, SWD RCC
-Members: Chiefs, District Reservoir Control Sections

c. System Software Group
-Chairman: Chief, SWD ADP Center
-Members: District Elements

d. Applications Software Group
-Chairman: Chief, SWD Hydrologic Engineering Section
-Members: District Elements

Mr. Coomes stated that he was disappointed with the progress of the System Software Group and is optimistic that the newly appointed chairman will be able to pull the Applications and System Software Groups together. He also stated that during visits to district offices, concern had been expressed that not enough meetings had been held between the groups. A new concept has been developed to expidite activities.

5. SWD Downlink. The Downlink for the SWD WCDS System is located at the Federal Center, Fort Worth, Texas, Fort Worth District. Mr. Arnoldo Escobar a representative from the district gave the status of the installation of the link. He stated that the installation is essentially complete. All telephone lines have not been installed due to the backlog of work of the Bell Telephone System. Installation of lines should be completed by begining of calendar year. Cur- rently, one dedicated line is in operation between the Federal Center and the district's H-100. FWD plans to use software that is being used by the Ohio River Division. Also plans to form a task group within the district to develop additional software that will be required for the downlink. Mr. Coomes recommended that the Users Group Committee be involved. He feels that no one single district should have the total responsibility.

6. Overview of the WCDS. Mr. John Parks stated that the field equipment acquisition is about 75 percent complete and is comprised of a mixture of equipment purchased from different vendors. He cautioned that the Corps has become a part of a data collection community which requires informing other members of our data use; therefore, standarization of equipment is becoming more essential. To accomplish this goal, the GOES DCS Hydroment Users Working Group, a subcommittee of the technical working group organized by enviornmental satellite data and information service, has established a committee for this purpose. A brief summary was given to the group regarding a meeting that John conducted in the Fort Worth District Office for field personnel which are involved in the operations and maintenance of field equipment. Representatives from the SWD/ Districts and the USGS offices were in attendance. Some of the past year's activities and accomplishments included such items as contacts with the NWS (with regard to cooperative data exchange), completing the installation of all computers and output devices have been acquired by the districts on an as needed basis.

7. Memorandum of Understanding (MOU) With The USGS.

a. Fort Worth and Galveston Districts. Mr. Jim Kosclski stated that the reason for entering into the MOU between the districts and the USGS was due to the districts' lack of manpower capability to operate and maintain their WCDS field equipment.

b. Little Rock District. The reasons for the district entering into their

MOU, as stated by Mr. Jim Proctor, was due to the lack of obtaining real-time data from the USGS. The MOU defines specifically what data are needed on a station by station basic, i.e, repair of critical stations on real-time basis. SWD feels that the agreements were great strides in getting the USGS to place a higher priority on Corps needs. Also, feels that with the amount of money that the Corps provides the USGS through the Cooperative Programs, the Corps should rightfully be able to impact thier priorities. The Tulsa District is currently working with the USGS for establishing real-time priorities. In conclusion, SWD recommended that all districts look at the possibility of entering into agreements, similar to Little Rock's, with the USGS.

8. MOU Between the Corps and the Southwestern Power Adminstration. Mr. Terry Coomes gave the current status of the agreement and stated that the development of the MOU was initiated for the purpose of obtaining better management of hydropower production and other project purposes at Corps power projects.

9. MOU Between SWD and Nonfederal Hydropower Developers at Corps Projects. Mr. Bill Isaacs led the discussion by giving an overview of requirements for developing plans for the MOU between the Corps and the nonfederal interests. He stressed the importance of continued Corps project operations in accordance with project design criteria. SWD suggested that a standard format be developed for inclusion in comments to FERC on review of license applications. The format should include operation for project purposes, special operations, coordination for dispatching of hydropower, requirements for system studies, etc. Experience that other Corps Divisions have had indicates that the MOU should be developed to include stage plans, i.e, plan during construction for both low flows and flood flows, water control plan for use after add-on has been constructed, etc.

10. System Regulation Studies. Mr. Ron Hula presented the current status of data bases for SWD reservoir regulation model studies (see attachment 3). These data bases are used in the computer program titled "Super" for reservoir system regulation simulation studies. The "Super" Program is presently located on the LBL system; however, within about 2 months the program will be moved to the CDC system. Therefore, all future "Super" runs should be made on the CDC system. The Hydrologic Modeling Center which is a newly established center located in the Tulsa District was also discussed. The center will be responsible for running the "Super" Program and like other hydrologic engineering sections, the center will have the capability of making hydropower studies. The SWD will require documentation of all programs developed by the center. Procedures for districts to use in requesting assistance from the center will basically be a description of the plan to simulate, computed reservoir inflows (placed in a file), and economic data which are required for regulation studies. SWD requested that all district study request be prioritized and priority should be placed on reservoir systems without previous studies as opposed to ones requiring revisions.

11. Water Control Manuals. Mr. Ralph Garland summarized the past year's manual scheduled as compared with the number of manuals that were actually developed and submitted to SWD for review and approval. The districts were encouraged to be more realistic in developing their manual schedules, particularily for

upcoming year, in order to decrease the desparity between manuals scheduled and those submitted. Also, the SWD reemphasized the importance of timely manual development for new projects and revisions to old ones where regulating changes have occurred

AGENDA
1983 ANNUAL MEETING
RESERVOIR CONTROL CENTER
SOUTHWESTERN DIVISION
2 November 1983

I. Introduction

II. Restructure of SWDO Water Management Branch

III. District Status

a. Status Report

b. Releases for Downstream Water Rights

c. Electronic Flow Gages

IV. Structure of the WCDS Software Development

a. Availability of FY84 funds for use in WCDS Software Development

b. Budgeting procedure for software in future years (FY86 and beyond) and should funds be included as part of the water management budget

c. WCDS master manual update

V. SWD Downlink

VI. Overview of the WCDS

VII. Memorandum of Understanding (MOU) with the USGS

VIII. MOU Between the Corps and the Southwestern Power Administration

IX. MOU Between SWD and Nonfederal Hydropower Developers at Corps Projects

X. System Regulation Studies

XI. Water Control Manuals

ATTACHMENT 1

1983 ANNUAL RCC MEETING
2 November 1983

ATTENDANCE LIST

NAME	ORGANIZATION
William E. Jones	SWFED-HL
Arnoldo Escobar	SWFED-HL
Dick Kreiner	SWAED-PH
Boyd Lare	SWAED-PH
Tasso Schmidgall	SWDED-WA
Cliff Victry	SWDED-WR
John H. Atkinson (Part Time)	SWDED-ZC
Jim Kosclski	SWGED-HC
Ralph Hight	SWTED-HM
Ron Hula	SWDED-WH
Terry Coomes	SWDED- W
James A. Proctor	SWLED-HR
John R. Parks	SWDED-WR
Charles Sullivan	SWDED-WR
Ross Copley	SWTED-HR
Ralph Garland	SWDED-WR
Carroll Scoggins	SWTED- H
William E. Isaacs	SWLED- H

ATTACHMENT 2

STATUS OF DATA BASE

FOR SWD RES REG MODEL

BASIN	RECORD	YEARS	NUMBER OF RESERVOIRS	CONT. POINTS	ECONOMIC DATA
ARKANSAS	1940-1974	35	20	38	YES
LARGE ARKANSAS	1940-1974	35	40	59	NO
TRINITY	1940-1969	30	15	29	NO
COLORADO	1930-1974	45	13	25	YES
WHITE	1940-1974	35	7	18	YES
RED	1938-1976	39	21	32	NO

ATTACHMENT 3

MINUTES
Hydrologic and Hydraulic Engineering Conference
Southwestern Division Office
3-4 November 1983

1. A conference to address hydrologic and hydraulic engineering concerns within the Southwestern Division (SWD) was held at the SWD office on 3-4 November 1983. An attendance list is attached as Attachment 1. Attachment 2 outlines the agenda for the meeting. As these minutes will reflect, there was some deviation from the agenda. Hydrologic and Hydraulic topics are summarized.

HYDROLOGIC TOPICS

2. The conference convened addressing the hydrologic engineering concerns at 0800 hours on 3 November 1983. Mr. Ron DeBruin, Chief, Study Management Section, Planning Division, SWD attended a portion of the meeting to discuss from a planning perspective the scope of work required for expanded reconnaissance studies in both the General Investigations and Continuing Authorities programs. Mr. DeBruin gave a brief background of the expanded reconnaissance study objectives provided for in EC 1105-2-114 for implementation into the continuing authorities program. Basically this type study was to provide a range of significantly different feasible alternatives and select the most likely recommendation for detailed planning and engineering and design. The intent is to determine whether or not a local sponsor is willing to share the cost of the remaining study before proceeding to detailed project design. From Mr. DeBruin's discussion it was concluded that the efforts put into an expanded reconnaissance study would depend on the scope of the problem encountered. The intent is to minimize planning activities (investigating various alternatives) on simplified projects and, from an approving authorization standpoint, spend less money. For low cost projects (less than $250,000) where the solution is evident, it would be feasible to conclude studies with an expanded reconnaissance report. However, for larger projects with more complex solutions, detailed project studies must follow the expanded reconnaissance studies.

3. Mr. Bob James, Geotechnical Branch, SWD, discussed the role of the newly formed Dam Safety Section in Tulsa District. Mr. James said that the purpose of the section is to maintain long range dam safety capability through a competent staff at one location (the Tulsa District). The work would be associated with projects that are operational. It was also pointed out that the Dam Safety MOU (currently being negotiated) describing this section was not designed to impact on the on-going hydrologic and hydraulic work of the districts. Existing arrangements for accomplishing this work would stand as is and take priority over the MOU. The MOU will apply to Albuquerque, Little Rock, and Tulsa Districts, but Albuquerque and Little Rock can continue to complete their own work as long as they have the necessary technical capability. With respect to dam safety reconnaissance studies, further studies for the reports that have already been submitted can still be accomplished by the proper district staff unless they want to contract the work to Tulsa.

4. Mr. Ron Hula, Water Management Branch, SWD, discussed the role of the Hydrologic Modeling Center which was set up in the Tulsa District. Mr. Hula indicated that five SWD spaces were permanently reserved for the center. Funding will come through the center finding its own work from within Tulsa District or the other districts of SWD. Mr. Ralph Hight of the Tulsa District was selected as chief of the center. The districts were requested to have outlined in two weeks the work they needed accomplished using the SWD SUPER Model to be performed by the center.

5. The meeting continued by addressing topics of concern submitted by the Tulsa District. One such concern was the development of the Standard Project Flood (SPF) for small watersheds. The problem appears to be when using one-half of the Probable Maximum Storm (PMS) taken from Hydrometeorological Report No. 51 (HMR-51), as instructed by SWD, the SPF peaks plot consistently higher than a 10,000 year frequency interval for small watersheds. This usually occurs regardless of the method for developing the frequency curve. In most cases this doesn't happen when using Bulletin 52-8 to compute the SPF. It was concluded that studies were needed to determine what causes the large differences in the SPF when using the two procedures. The districts were instructed to continue using Bulletin 52-8 for developing the SPF for small drainages until a common procedure is developed.

6. Another topic presented by the Tulsa District related to the application of Hydrometeorological Report No. 52 (HMR-52) procedures for SPF development. Field offices were told to ignore the HMR-52 procedures when using HMR-51 to develop the SPF.

7. The application of HMR-52 procedures to large watersheds was discussed. The two problems presented were (1) the condition when the PMP storm size is larger than 20,000 square miles, and (2) the poor justification for the reduction in Probable Maximum Precipitation (PMP) rainfall due to pattern orientation. The districts were told that if they in any case deviate from the HMR-52 orientation procedures, they must submit valid reasons for doing such.

8. The application of Technical Paper No. 40 (TP40) rainfall to synthetic discharge - frequency estimates was another topic of discussion. The problem is associated with the fact that TP 40 rainfall usually results in higher discharges than anticipated for the more frequent floods. The result is a much flatter discharge - frequency curve. An accepted procedure is to calibrate the synthetic curve to gages in or close to the study area. The problem is that in many cases no long term gages exist to perform the calibration. It was concluded that using the 100-year TP40 value along with a regional frequency curve slope analysis would produce acceptable discharge - frequency estimates.

9. In discussing the SWD version of HECWRC it was pointed out that this version computes low outliers different than the original program. SWD agreed to revise the program to correct this.

10. Tulsa District discussed briefly the PCA Hydropower analysis procedure. This procedure was developed to show power generation based on the actual operation of the project. Computations are based on a single reservoir version

of the SUPER Model that does not lose sight of the remaining system operation. Average annual values are computed on a daily basis with the values varying with how the power is being used for that day. In essence rule curve operation is used which over a long period of time approximates the way SPA operates the projects.

11. The hydrologic phase of the conference ended with the following agreements being made.

a. Efforts put into expanded reconnaissance studies should depend on the scope of the problem encountered. For low cost projects with simple solutions, it would be acceptable to conclude studies with an expanded reconnaissance report. However, for larger projects with more complex solutions, detailed project studies must follow the expanded reconnaissance studies.

b. The Dam Safety MOU was not designed to impact on hydrology and hydraulics work. Existing arrangements on this work would stand as is and takes priority over the MOU.

c. The districts should have outlined in two weeks the work they needed performed by the Hydrologic Modeling Center using the SWD SUPER Model.

d. The districts can continue to use Bulletin 52-8 for determining the SPF for small drainages until a common procedure is developed.

e. It is not necessary to use HMR-52 procedures when using HMR-51 to develop the SPF.

f. Deviations from the HMR-52 orientation procedures for developing the PMS must be accompanied by valid reasons for doing such.

g. Using the 100-year TP 40 value along with a regional frequency curve slope analysis would be an acceptable procedure for computing synthetic discharge - frequency estimates.

h. SWD would revise its version of the HEC WRC program to change the procedure for computing low outliers.

HYDRAULICS TOPICS

12. In April 1983 the hydraulics design functions in SWD were transferred from the Technical Engineering Branch to the Water Management Branch. Renamed the Hydraulics Section this unit now combines hydraulic design, water quality and sedimentation functions. The personnel within the new station are also experienced in computer applications for hydraulics computations. Tasso Schmidgall, the chief of the new section introduced Ray Bodine and Dave Brown as the personnel comprising the section. Both these engineers had transferred into the new section from other sections within the Water Management Branch.

13. The major topic for discussion was the need for sedimentation studies in connection with the development of flood channel facilities for local flood protection projects. Such projects are becoming a significant part of the total Corps civil works load. Tasso Schmidgall introduced the subject and explained its importance in project planning and design efforts. The basic need of these studies is to insure that the natural hydraulic and sedimentation characteristics of a stream will support proposed channel enlargements or changes. Too often the natural sediment characteristics of a stream have tended to shoal-in excavated channels to nearly pre-project size and capacity. Periodic re-excavation of the depositions are too expensive for local sponsors, so the benefits of their flood control project are essentially lost. Another common problem of ill-conceived channelization projects is that flow velocity increases within or upstream from the projects are so great that serious bank scouring and bed degradation occurs. Loss of bridge and utility crossings and serious environmental damage have been the results. Several factors which District's should consider in responding to sediment study requests were discussed.

a. A thorough analytical sediment study for a stream requires samples of suspended and bed load materials during a range of discharge conditions. Such data, along with traditional cross-section and flow data, are seldom available on the minor sized streams involved in most local protection projects. Sediment data samples are difficult to get and usually require several years of data collection to obtain truly representative samples. Once reliable data is obtained, computer programs such as HEC-6 are used to establish a model for reproducing existing sedimentation conditions. The model is then altered to simulate proposed channel changes and rerun to determine probable sedimentation effects resulting from the proposed project. These computer programs are complex and require experienced operators to obtain reliable results. The total time, manpower and costs required for conducting such studies are high - usually well outside the normal time and cost constraints alloted for the hydrologic and hydraulic planning and design of local protection projects. The scheduling of a complete sedimentation analysis for a high percentage of local protection projects would economically shift them from a feasible to an infeasible project.

b. Alluvial streams are generally acknowledged to be approaching a state of equilibrium with respect to their stream geometry, sediment characteristics and discharge conditions. A change in any one of these factors will, over a period of time, cause adjustments to the other two factors. The critical element is the period of time. It may be as short as the passage of a single flood event or require several decades.

c. Several factors were discussed as being useful to hydraulic engineers in evaluating the rate of sediment characteristics changes in a stream. An evaluation of all these factors should be included in proposed project reports and should be used as a basis for evaluating the need for more sophisticated sedimentation studies.

(1) Conduct a reconnaissance of the entire stream basin. Familiarity with maps and aerials of the basin should precede the land (and if possible air) inspections. During inspections, note the general topography of the basin, the

outstanding geologic formations, and the type, density and extent of natural vegetative cover. Identify the extent of agricultural, industrial, urban, and other man-made developments in the basin. Note the general alignment and meandering tendencies of the stream and its tributaries. Note stream reaches that are experiencing active sedimentary adjustments as characterized by caving banklines, channel bed headcutting or freshly deposited shoals. If possible, stream conditions should be observed both during flood flow and low flow periods.

(2) From an investigation of old maps, plans, and other data, compare historic stream alignments with current conditions and evaluate the rate of channel shifting over the past 50 years or so - a length of time equivalent to the normal economic life of flood control projects. Consider shifts in both the full flood cross section and low flow sections of the stream.

(3) Determine if the stream within the project area is in the process of adjusting to recent major changes in the hydraulics, sedimentary, or geometeric conditions. Typical examples of such changes would be discharge reductions because of flow diversions, sediment load increases due to land clearing developments, or channel size reductions due to bridge crossings or development encroachments.

(4) Determine the general shape, size, width and depth of the stream cross-section. Note braiding tendencies, scour holes, shoals, dunes and point bar developments within the channel. Note also raw material banklines which are actively caving. The presence of these type of stream formations are best checked following the recession of flood flows.

(5) Conduct a geomorphic analysis of the stream. Evaluate the type, consistency and general erodability of materials in the bed and banklines. Check for bankline caving. Determine if caving is due to stream velocity erosion or to instability of bankline materials as frequently would be caused by groundwater seepage into the creek. Note, if possible, the depth of firm rock below alluvial bed deposits. Note the occurance of gravel lenses within the bed materials which indicate natural armoring tendencies. Joint inspections by hydraulics and geologic personnel for this analysis is encouraged.

(6) Evaluate the effects of natural vegetation on stream bankline and bed stability. Note capability of stream to support vegetation. Note maturity of the vegetation on banklines which can indicate the stability of a stream alignment.

(7) The suspended sediment load of a stream is a useful index of potential bed adjustments during floods. One relative indicator of sediment loads is the color of flood water as opposed to the color of low flow water in a stream. Another useful indicator is thickness of the silt layer remaining on flooded overbank areas following recession of the flood.

14. Math Modeling efforts in Hydraulics Section were discussed. Ray Bodine described his one and two dimensional models and explained their potential uses.

Gist Wilbur described his use of the 1-D model in analyzing the proposed effects of the Little Rock Airport runway extention on Arkansas River flows. David Brown explained his efforts in converting hydraulic programs presently in common use for application to the inhouse Harris Computer system. Both Ray and Dave are available to assist the district staffs in computer applications to hydraulic studies.

15. A special Corps conference on the design of hydropower add-on facilities to Corps projects was conducted on 25-27 October 1983 in Waltham, Massachusetts. Tom Horner attended and provided a summary of applicable information.

a. The Federal Energy Regulation Commission (FERC) is the agency which grants permits and licenses for non-Federal agencies to develop hydropower facilities at existing Corps projects. The Commission consists of 5 members - all lawyers. The importance of a thorough technical review by the Corps was stressed. Remember that Preliminary Permits allow applicants to perform feasibility studies. The permits grant applicants access to the federal project. The license is essentually a permit to construct. Therefore, all technical concerns need to be covered at this level of review.

b. All proposed projects must provide adequate facilities and operational constraints to at least maintain the existing water quality conditions of project releases.

c. Model studies are frequently required to insure proper hydraulic functioning of add-on facilities. Pittsburg District requires the applicant to conduct model studies of all proposed projects. Normally private or non-federal facilities conduct the studies, but special division level permission can be granted to conduct studies at WES if physical model facilities of the project are already available there.

d. The Vermont Electric Cooperative was granted a license to construct hydropower add-on facilities to the North Hartland Dam in November 1981. The existing project had an outlet works with gated intake tower and a 14.33 foot diameter discharge conduit. The development consisted of adding a 12-foot diameter free standing steel liner within the conduit. A bifurcation will be added downstream with one leg leading to the powerhouse and the other to a radial gate control structure and a stilling basin. The upstream trashrack will be modified to provide a finer grid and enlarged to limit velocities to 4 fps for hydropower releases and to 10 fps for flood control releases. The existing intake tower gates will be maintained to provide the Corps with flow cutoff capability. During project construction, low flow requirements were maintained by pumping the necessary flows for release over the side channel spillway facility.

16. The final topic of discussion was the SWD sediment data collection and evaluation program. A basic concern in the design of the reservoir projects on alluvial streams is how quickly the deposition of natural stream sediments will reduce the lakes' storage capacity. When storage reductions affect the design capacity of project purposes such as municipal water supplies, the impacts can be significant. Consequently, project design documents frequently call for periodic reservoir surveys to keep tabs on the actual rate of sediment buildup.

a. In practice, periodic sediment surveys have been made on many SWD projects. In some cases, the surveys have been analized and the rate of lake capacity reduction verified in reports. In a number of other instances, surveys have been made, but because of time, money and staff constraints, no further work has been accomplished.

b. SWD has been evaluating the sediment survey program division-wide to insure that benefits are commenserate with the costs. A June 1981 multiple letter identified five project factors for justifying sediment surveys:

(1) Projects where very accurate capacity tables are required by law.

(2) Projects where an updated capacity table has been requested by a user that will be paying part of the survey cost.

(3) Projects where sediment distribution between flood control and conservation storages is significantly different from that assumed in the design.

(4) Projects where a major storage reallocation is being considered.

(5) Projects where reconnaissance type surveys show that capacity tables are in error to the extent that project purposes are noticeably impacted.

c. Tulsa District is now the only district with surveying equipment assigned to its Engineering Division. Their mobile equipment and crew are available to conduct lake surveys for any SWD project. Their current survey schedule as approved by SWD in October 1982 includes reservoir surveys on 8 projects in FY83, 5 in FY84 and 5 in FY85. The justification for these projects was discussed.

d. Use of abbreviated, rather than full reservoir surveys was discussed as a possible means for reducing survey costs.

e. Establishment of permanent survey markers was discussed as a valuable aid in quickly conducting repeat surveys. However the long-term benefit must be weighed against costs of establishing and maintaining the markers.

f. Tom Horner described the TD survey boat and equipment. He explained that the boat was rather small for the equipment contained on-board and resulted in rather hazardous operations on large lakes during heavy wind-wave conditions. The district is currently reviewing its survey equipment for possible updating.

17. The conference was concluded with many expressions of the value of the discussions and a desire that SWD continue to sponsor the meetings annually.

Sam Bates Tasso Schmidgall

2 Attachments

SAM BATES TASSO SCHMIDGALL

ATTENDANCE LIST

Hydrology and Hydraulics Conference
Southwestern Division Office
3-4 November 1983

SOUTHWESTERN DIVISION OFFICE	
Terry Coomes	SWDED-W
Ron DeBruin*	SWDPL-MS
Robert L. James*	SWDED-G
Ron Hula	SWDED-WH
Charles Sullivan	SWDED-WR
Tasso Schmidgall	SWDED-WA
Sam Bates	SWDED-WH
Ralph Garland	SWDED-WH
J. Leon Curtis	SWDED-WH

ALBUQUERQUE DISTRICT	
Boyd Lare	SWAED-PH
Dick Kreiner	SWAED-PH

FT WORTH DISTRICT	
Paul K. Rodman	SWFED-HH
Ronald L. Turner	SWFED-HG
Paul Bowers	SWFED-HL
Stephen Pilney	SWFED-HH

GALVESTON DISTRICT	
Roy Different	SWGED-HD
Gerald Dunaway	SWGED-HD

LITTLE ROCK DISTRICT	
William E. Isaacs	SWLED-H
Gist Wilbur	SWLED-H
Mack Osborn	SWLED-H

TULSA DISTRICT	
Carroll Scoggins	SWTED-H
Ed Hudson	SWTED-HE
Ralph Hight	SWTED-HM
Thomas Horner	SWTED-HE

*Part-time

Attachment 1

AGENDA
1983 HYDROLOGY-HYDRAULICS MEETING
WATER MANAGEMENT BRANCH
SOUTHWESTERN DIVISION
CORPS OF ENGINEERS
3 and 4 November 1983

3 November 1983 - HYDROLOGY — AM

I. Role of Dam Safety Section (RL L. James) — 0800

II. Role of Hydrologic Modeling Section (R. Hula)

III. Tulsa District Topics: — ± 0900

a. Scope of work required for expanded recon studies.
b. Application of HMR52 to large watersheds.
c. SPF for small watersheds
d. Application of HMR52 to SPF development.
e. Application of TP40 to synthetic discharge-frequency estimates.
f. SWD version of HECWRC.
g. Documentation and use of SWD Interior Drainage Models.
h. Development and applications of SWD SUPER by Hydrologic Modeling Center
i. Tulsa District PCA Hydropower analysis procedure.

IV. Other Hydrology Topics.

3 November 1983 - HYDRAULICS — PM

V. Introduction (T. Schmidgall) — ± 1300

VI. Hydraulic Topics:

a. Sedimentation considerations in channelization projects (T. Schmidgall)

b. Math Modeling for hydraulic problems:

(1) SWD Model developments (R. Bodine).

(2) Little Rock Airport runway problem (G. Wilbur).

(3) Conversions to Harris Computer (D. Brown).

c. Hydropower add-on to existing projects (T. Horner).

VII. Adjourn — 1530

Attachment 2

4 November 1983 - HYDRAULICS, (CONTINUED) AM

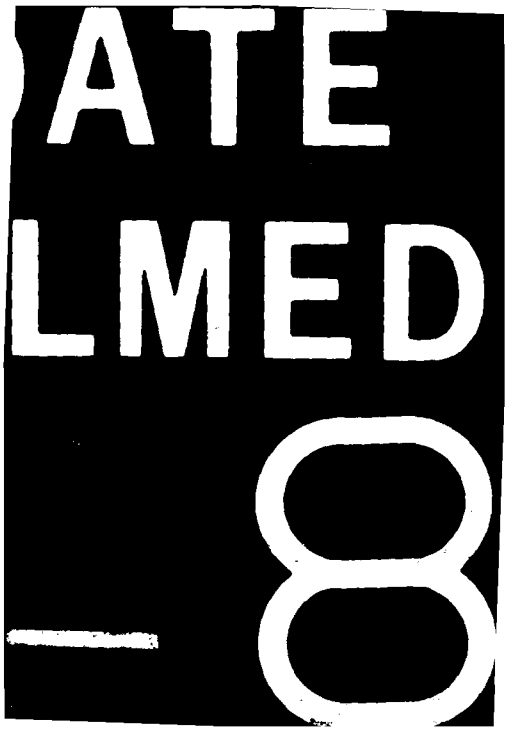
VIII. Hydraulic Topics, Cont: 0800

d. Sediment Data Collection and Evaluation Program (T. Schmidgall)

e. Other Hydraulics Topics

IV. Conclusions (T. Coomes)

X. Adjourn 1100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